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HEALTH ASSESSMENT RISK - PERICLES IMPROVEMENT (HARPI)

AUGUST 1997

PREPARED BY
RESOURCE ANALYSIS DIVISION

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The US Army has been tasked to evaluate the status of public health in foreign countries in response to a Presidential Decision Directive. An analytic methodology is required to assess the public health challenges facing each nation and each country's capabilities to respond. This methodology enhances the US Army's ability to evaluate the risk of instability in foreign countries as a result of the public health situation in that nation. The status of public health in each nation is evaluated using the methodology developed in order to identify countries facing potential crises and to formulate potential US responses.

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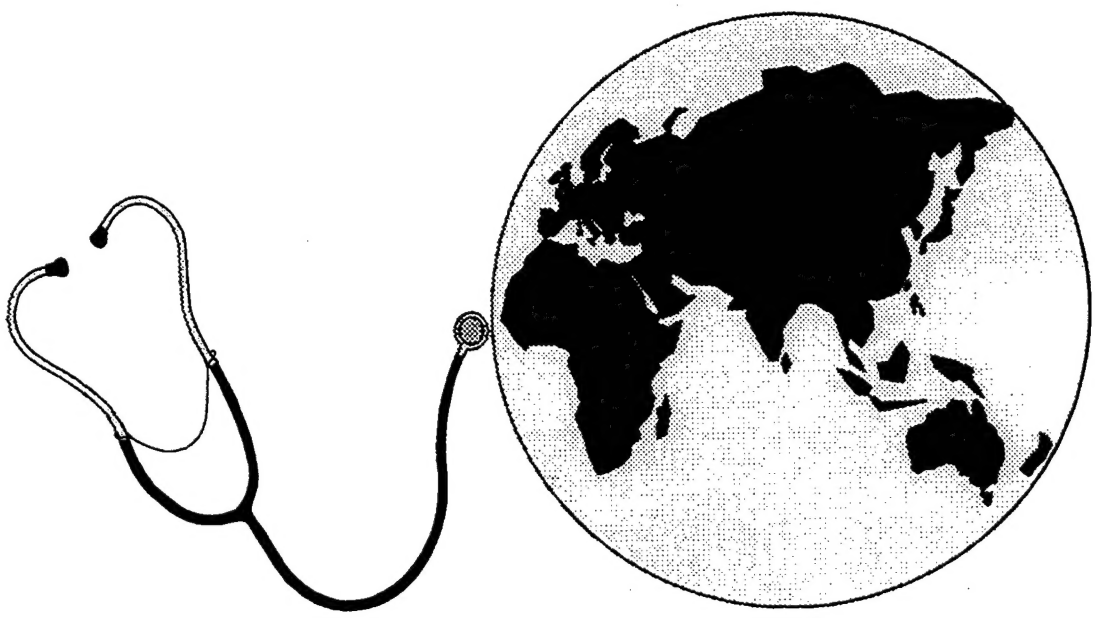

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HEALTH ASSESSMENT RISK - PERICLES IMPROVEMENT (HARPI)

CHAPTER 1

INTRODUCTION

"As African birthrates and slums ... proliferate, diseases spread rapidly and experts worry that viral mutations and hybridization might conceivably result in a form of the AIDS virus easier to contract than the present strain. Conakry [capital of Guinea] might symbolize the new strategic danger – the Fulda gap of the future: a disease breakthrough far more serious and likely than the Russian army breaking into Europe."[1]

Robert D. Kaplan
The Ends of the Earth, 1996

1-1. ROLE. Robert Kaplan raises the specter of disease as constituting a basic threat to humanity. He suggests that population growth and the resulting migrations and soil degradation are leading to an uncontrollable spread of disease. In a Presidential Decision Directive on emerging diseases issued June 12, 1996, President Clinton established "a national policy to address the threat of emerging diseases through improved domestic and international surveillance, prevention, and response measures."[2] The role of Department of Defense (DOD) was expanded to include support for global surveillance efforts to monitor emerging infectious disease threats.

1-2. PURPOSE. The US Army has been tasked to evaluate the status of public health in foreign countries. An analytic methodology is required to assess the public health challenges facing each nation and each country's capabilities to respond. The methodology developed enhances the US Army's ability to evaluate the risk of public health instability in foreign countries. The status of public health in each nation is evaluated using the methodology developed in order to identify countries facing potential crises and to formulate potential US responses.

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[1] Kaplan, Robert D. "The Ends of the Earth:" A Journey at the Dawn of the 21st Century, Random House, 1996, p 38

[2] National Science and Technology Council, "Fact Sheet Addressing the Threat of Emerging Infectious Diseases," June 12, 1996

1-3. BACKGROUND. The PERICLES Study developed and demonstrated an analytic methodology which evaluates selected structural determinants, or factors, which can indicate the potential for national instability. The intent of that effort was to develop a tool which would assist analysts in the identification of countries that were potentially at risk of instability and to facilitate the evaluation of options for peacetime engagement. Study Report CAA-SR-96-9, PERICLES Political and Economic Risk in Countries and Lands Evaluation Study (PERICLES), dated August 1996, documented the first phase of that study. Study Report CAA-SR-97-3, PERICLES Political and Economic Risk in Countries and Lands Evaluation Study II (PERICLES II) dated August 1997 completed that study. A summary of the architecture for the PERICLES studies is included as Appendix E to this report. This will assist in placing this QRA in the proper perspective. One of the factors examined in PERICLES was "public health." This quick reaction analysis is designed to examine that factor in greater detail.

1-4. OBJECTIVES

a. Identify factors that could lead to national public health risk.

b. Apply the approach used in the PERICLES studies to establish a methodology for assessing public health risk.

c. Determine the public health situation in foreign states using the methodology.

1-5. SCOPE

a. Timeframe of analysis - current.

b. The study included 238 countries of the world.

c. The response capabilities of a nation are included in the study as well as the challenges to its public health well-being.

1-6. PERICLES METHODOLOGY

a. The PERICLES methodology was identified by the sponsor as a potential framework for analysis of a nation's public health conditions and response capabilities.

b. The purpose of PERICLES was to develop and demonstrate an analytic methodology that incorporates quantifiable measures of risk associated with foreign nations as part of the Army's overall threat assessment. The PERICLES effort developed a tool which can support analysts in the identification of countries which are potentially at risk of instability and facilitate the evaluation of options for peacetime engagement. This engagement is defined by the Army as "the strategic concept that coordinates the application of political, economic, and military means to promote stability and counteract violence all along the operational continuum short of major regional conflicts. The goals of peacetime engagement are to promote peace and obviate the need for a US combat response to crises by addressing the root causes of instability."[3] The

[3] US Army Office of the Deputy Chief of Staff for Operations and Plans definition.

PERICLES methodology measures political, economic, social-cultural, and environment-infrastructure factors of risk.

c. The PERICLES methodology aims to improve the understanding of the factors of instability. In addition, the methodology can be useful in formulating alternatives once a country is identified as potentially unstable. PERICLES is designed to function as an executive-level decision support system as well as an analytic tool for identifying and evaluating potential areas of concern to the US and its allies. See Appendix E for a summary of the PERICLES methodology. A review of paragraph E-4 is essential to an understanding of HARPI.

d. The HARPI QRA follows the conventions described in Appendix E concerning PERICLES. Raw data are tabulated in Appendix C. Data are translated into common units of risk rating for all factors. Translated data are found in Appendix D.

e. HARPI is a subset of the "public health" factor found in the PERICLES II Study. Whereas the latter used only infant mortality as a surrogate for the entire public health field, HARPI employs 11 factors for the purpose of providing a more detailed examination of a nation's public health status.

1-7. LIMITATIONS

a. The following 11 factors are considered in HARPI: child mortality, life expectancy, incidence of malaria, HIV-1 seroprevalence, accident/injury rate, access to sanitation, access to safe water, access to health facilities, population per doctor, calories per capita, and literacy. Additional factors may still be identified, and some of the current factors may need to be combined.

b. Data are unavailable for certain factors for certain countries. Additional data needs to be collected to fill in where data is missing.

c. For the purpose of this QRA, the "current" timeframe refers to the most recent years for which data were available.

1-8 KEY ASSUMPTIONS

a. The best available factors were included in HARPI as determined by a survey of the literature and interviews with health assessment organizations.

b. The data associated with each factor have been extracted from the United Nations and the World Health Organization data bases and are as reported by the individual nations. The data are assumed to be accurate and reflective of the current situation in that country.

CHAPTER 2

HARPI METHODOLOGY

"Preventive defense may be thought of as analogous to preventive medicine. Preventive medicine creates the conditions which support health, making disease less likely and surgery unnecessary. Preventive defense creates the conditions which support peace, making war less likely and deterrence unnecessary."[1]

William J. Perry
US Secretary of Defense, 1996

2-1. OVERVIEW

a. In his address, Secretary Perry stressed that the end of the Cold War provides the United States and her allies the opportunity to focus on a strategy which makes "preventive defense" the first line of defense, deterrence the second, and relegates military conflict to the third and last line of defense. Threats to public health can be destabilizing to a country's national well-being. The HARPI methodology supports the preventive defense concept by identifying both challenges to public health and a nation's capability to respond to those challenges. The methodology presents an overall assessment of the relationship between public health challenges and a country's response potential.

b. The United States is becoming increasingly concerned about "emerging infectious diseases" (EIDs) which threaten to become the most significant challenge facing the global health community. "Despite improvements in sanitation, personal hygiene, diet and health education, infectious diseases are still the number one killer worldwide. ... Transmission of infectious diseases through all media--air, water, food, soil, personal contact, and vectors such as insects and other animals--and all populations occurs at accelerated rates because of international travel and migration as well as trade and environmental change."[2] Population growth, coupled with increases in agriculture and land development, are contributing to the rising spread of infection. "In a sense, the earth is mounting an immune response against the human species. It is beginning to react to the human parasite, the flooding infection of people, the dead spots of concrete all over the planet, the cancerous rot-outs in Europe, Japan, and the United States, thick with replicating primates, the colonies enlarging and spreading and threatening to shock the biosphere with mass extinction."[3]

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[1] Perry, William J.: Address at John F. Kennedy School of Government, Harvard University, May 13 1996.

[2] Platt, Anne E.: "Confronting Infectious Diseases," pp 114-132, in State of the World 1996, Worldwatch Institute, New York 1996.

[3] Preston, Richard: The Hot Zone, Anchor Books, 1994, p 406-7.

c. The US Department of Defense is being called upon to increase its surveillance, prevention efforts, and response capabilities to the threat of these EIDs. DOD, in coordination with the Center for Disease Control (CDC) and other US Government agencies, has been directed by the President to expand the available diagnostic and treatment capabilities at its laboratories and improve its preventive health and epidemiological capabilities with the goal of assisting the US and other nations address the global public health challenges. These public health challenges and the available public health response capabilities must be identified.

d. Public health is defined as the "science and art of preventing disease, prolonging life, and promoting health and human efficiency through organized community efforts. The efforts are directed toward sanitation of the environment, control of communicable infections, education of individuals in personal hygiene, organization of medical and nursing services for the early diagnosis and preventive treatment of disease, and the development of social machinery to ensure for every individual a standard of living adequate for the maintenance of health." [4]

e. The public health data used in PERICLES is based on data provided by country health authorities as reported by the UN and the World Bank. An incident cited by Alan Whitehead highlights the importance of reliable data. The terms of a Structural Adjustment Program for Zimbabwe implemented as a result of a World Bank loan in the late 1980s required that the government charge for treatment at its clinics. People who could not afford treatment for sexually transmitted diseases (STDs) no longer visited the clinics, resulting in an apparent decline in the incidence of STDs.[5]

f. The PERICLES framework will be used as the overarching structure for this quick reaction analysis. This chapter discusses the HARPI methodology shown in Figure 2-1. The methodology was developed along the lines of public health challenges and state capabilities to respond to those challenges.

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[4] New Encyclopedia Britannica, Vol. 9, p 778, University of Chicago, Chicago, 1988.

[5] Whitehead, Alan: "AIDS: Socio-economic Causes and Consequences," University of Natal, Durban, 1993.

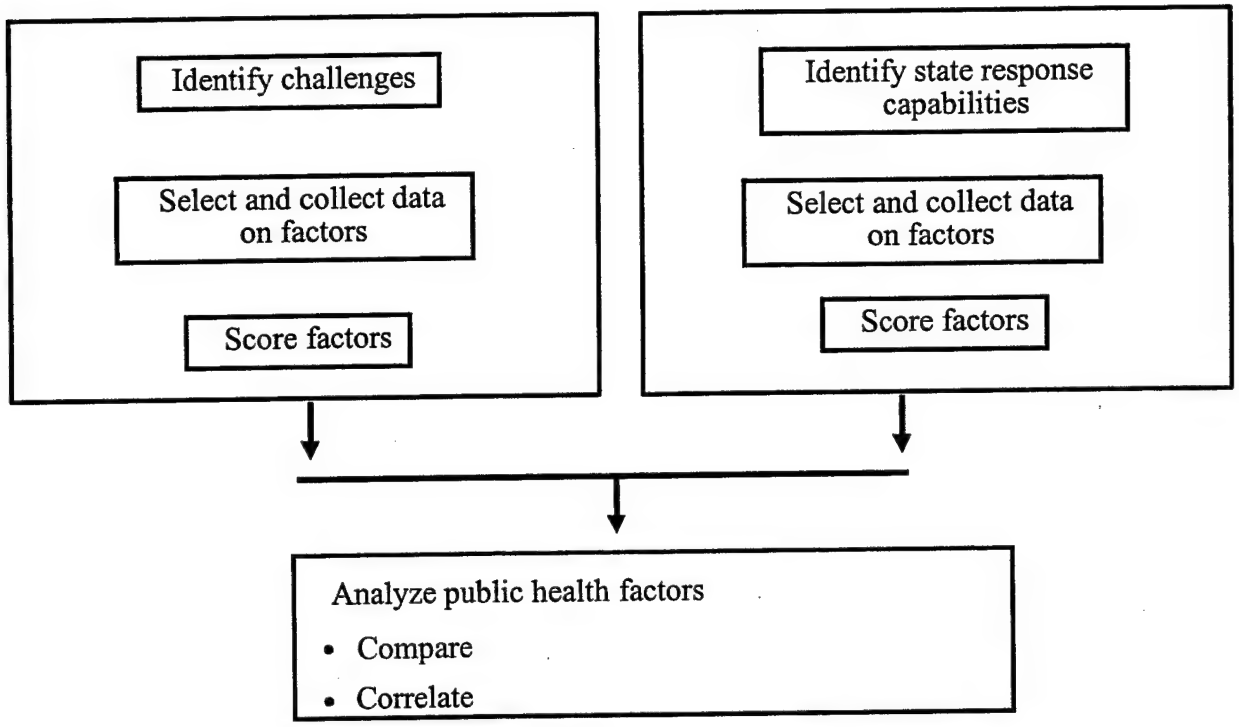

Figure 2-1. HARPI Methodology

2-2. IDENTIFY CHALLENGES AND STATE RESPONSE CAPABILITIES. A literature search was conducted and public health workshops were attended. A number of organizations and individuals involved in public health risk assessment were interviewed, including Dr. Khalid Shibib and a group of World Health Organization health analysts. Colonel Benenson, Chief of the USAREUR Preventive Medicine Brigade, discussed the use of public health factors as predictive devices in that theater of operations. Additional interviews were conducted with Dr. William Lyerly at the Agency for International Development (AID), Major (Dr.) Roberto Nang at the Center for Health Promotion and Preventive Medicine (CHPPM) at Aberdeen Proving Ground, and Dr. Deborah Keimig at the Armed Forces Medical Intelligence Center (AFMIC) at Fort Dietrick. From the suggestions provided by these sources, potential candidate factors became evident which might serve as measures of public health status for the countries of the world.

2-3. SELECT AND COLLECT DATA ON FACTORS. From the above investigations and interviews, 11 factors were chosen for use in the study from the candidate factors. Table 2-1 displays the factors selected. There are five factors which constitute public health ***challenges***. The other six factors are measures of the state's ***capability*** to respond to these challenges. Data were collected for each of the factors. Extracts were obtained from the data bases maintained at the UN Human Development Office and the World Bank. Data used are shown in Appendix C.

Table 2-1. Public Health Factors

Challenge factors:
Child Mortality
Life Expectancy
Incidence of Malaria
HIV-1 Seroprevalence
Accident/Injury Rate
Capability factors:
Access to Sanitation
Access to Safe Water
Access to Health Facilities
Population per Doctor
Calories per capita
Literacy

2-4. SCORE FACTORS. Since the selected factors were expressed in different units of measurement, it was necessary to standardize the factor values into a common set of indicators, or scores, that reflect the "risk" of factor for each country. Using the PERICLES approach, each factor value was translated into an indicator on a scale between 0 and 5 (5 reflecting the greatest risk). Thus, five levels of risk are addressed in the study. The K-mean technique, described in Appendix H of the PERICLES report (CAA-SR-96-9), was used to establish the five levels. A summary of the K-mean technique is provided at paragraph E-4a. The PERICLES Risk Evaluation and Presentation System (PREPS) was used to align indicator values with different shadings on a world map for each factor for each country. The scores are shown in Appendix D.

2-5. ANALYZE AND COMPARE FACTORS. An analysis and comparison of the scored challenges and capabilities for each country was then conducted. This included a correlation analysis among the challenge factors and the capability factors..

a. Overview. Each factor was analyzed to ascertain each nation's status *vis-a-vis* the other countries. Challenges are discussed first, followed by capabilities. A paragraph on correlation analysis is then presented. Correlation analyses were performed to investigate the possibility of mutual relationships among the factors' measurements.

b. Public Health Challenges. Table 2-2 reflects five public health challenge areas. Data for these factors are at Appendix C on pages C-1 through C-4. The corresponding ratings are in columns 4 through 8 at Appendix D on pages D-2 through D-6.

Table 2-2. Public Health Challenges

Child Mortality
Life Expectancy
Incidence of Malaria
HIV-1 Seroprevalence
Accident/Injury Rate

(1) Child Mortality. Analysts at the World Health Organization recommended that HARPI use "Under age 5 Child Mortality" as a factor instead of "infant mortality." In many countries, babies do not become a birth/death statistic until reaching 2,500 grams. Other countries, such as the United States, do not make such an allowance. "Under age 5 Child Mortality" is therefore a more comparable factor. Table 2-3 presents a summary of the 144 nations for which under 5 child mortality data were available.

Table 2-3. Under 5 Child Mortality (per 1,000 live births)

Indicator	Range	Number of countries
1	<30	59
2	30-66	31
3	67-112	18
4	113-170	22
5	>170	14
Total		144

Figure 2-2 displays the child mortality data on a map. All 14 countries with the lowest ratings are in Africa, with 6 of these states experiencing child mortality rates of over 20 percent.

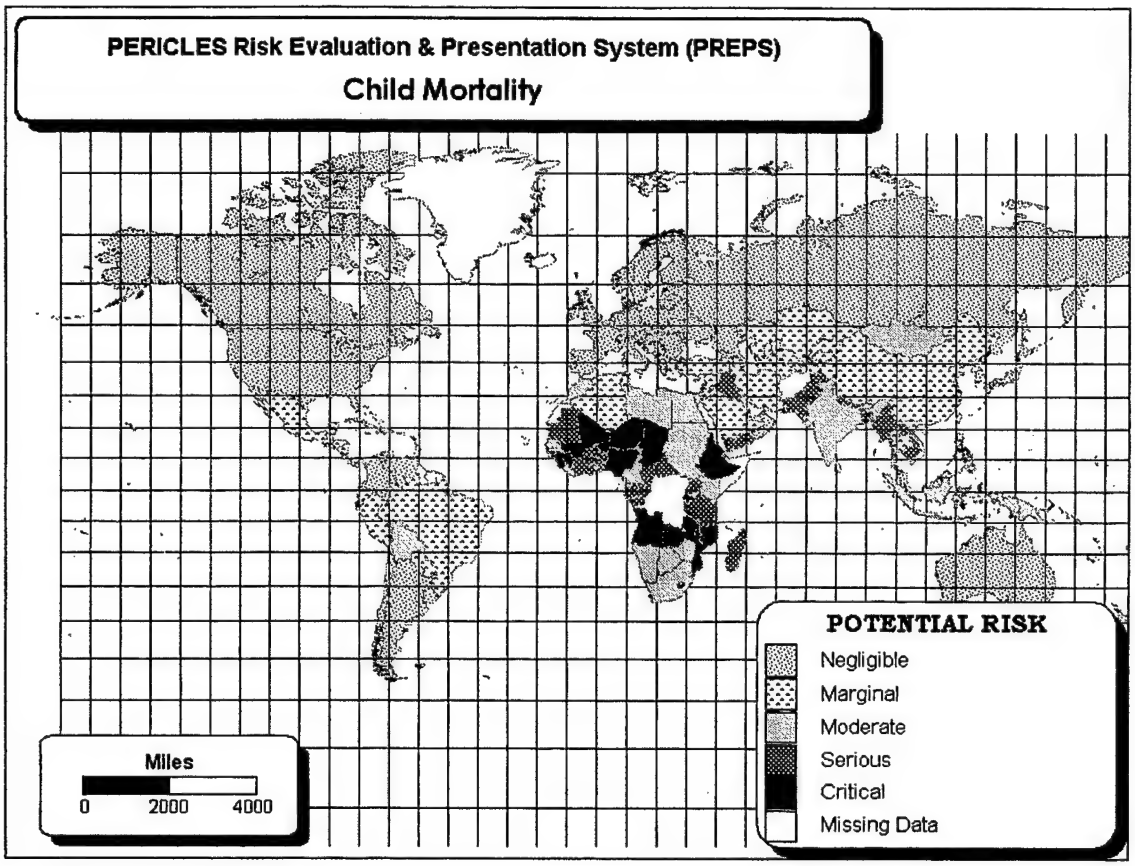

Figure 2-2. Under 5 Child Mortality

(2) Life Expectancy. Life expectancy refers to the average number of years projected to be lived by a group of people all born in the same year if mortality at each age remains constant in the future. Life expectancy is declining in a number of countries, as evidenced by the fact that the life expectancy for a Russian male in 1975 was 69, by 1985 it had declined to 64, and by 1995 it was reported as only 57 years. Table 2-4 presents a summary of 1992 life expectancy data for the 173 nations for which data was available. There is a span of over 40 years between Sierra Leone with an average life expectancy of 39 and Japan with an expectancy of 79.5. Twenty-nine percent (51 countries) of the reporting nations have a life expectancy of under 60, while 29 countries have a life expectancy of over 75. The gap between Haiti and the United States, for instance, is almost 20 years (56.6 vice 76).

Table 2-4. Life Expectancy (years)

Indicator	Range	Number of countries
1	>72.3	43
2	64.3-72.3	69
3	55.6-64.2	22
4	48.6-55.5	20
5	<48.6	19
Total		173

Figure 2-3 portrays the life expectancy data on a map. Of the 22 countries with a very low life expectancy, 21 are in Africa (Afghanistan has a life expectancy of 43.5) as are the preponderance of the countries in the fourth band (life expectancy between 50 and 59.9).

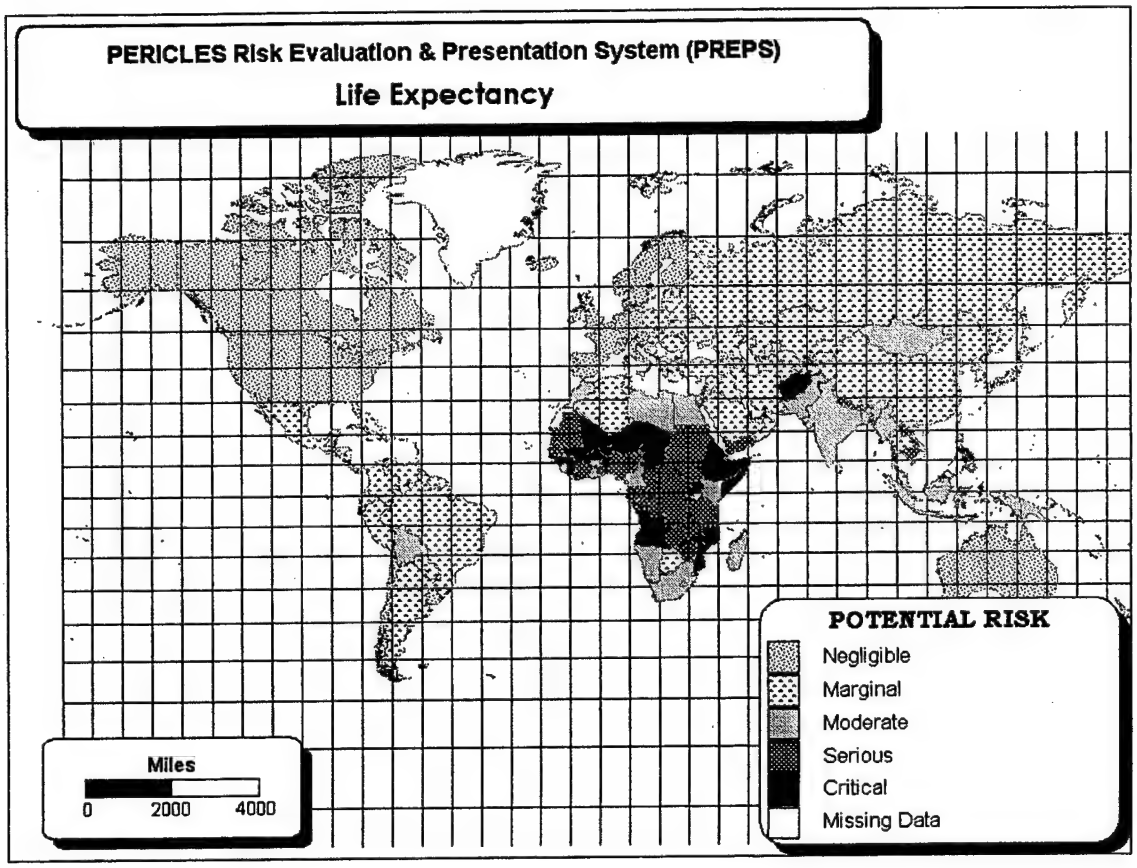

Figure 2-3. Life Expectancy

(3) Malaria. Table 2-5 presents a summary of 1992 malaria incidence data for the 45 countries for which the United Nations provided data. No data was provided for African countries. However, many of the countries in Africa have a high incidence rate for malaria. Kaplan reports that "it is malaria that is most responsible for the disease wall that threatens to separate Africa and other parts of the Third World from more-developed regions of the planet in the twenty-first century."[6] It is important to obtain accurate data on the incidence rate of malaria as well as other infectious diseases. The incidence rate of malaria in the Western Hemisphere is high, with four countries (Guatemala, Belize, Honduras, and Guyana) reporting incidence rates of over 1,000 per 100,000 inhabitants. "The spread of malaria is linked to activities such as road building, mining, logging, and irrigation projects. It is a particular problem in Amazonia. Malaria is not only a devastating disease for the individual, but a social condition closely related to economic development and in many cases an important obstacle to development."[7]

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[6] Kaplan, Robert D.: "The Coming Anarchy," Atlantic Monthly, February 1994, pp 44-76.

[7] The World Health Report 1995: Bridging the Gaps, World Health Organization, Geneva, 1995, p 24.

Table 2-5. Incidence of Malaria (per 100,000 population)

Indicator	Range	Number of countries
1	<360	21
2	360-1,180	13
3	1,181-2,720	5
4	2,721-7,900	4
5	>7,900	2
Total		45

Figure 2-4 portrays the 1991 malaria incidence data on a map. The two worst countries are in Asia (Vanuatu and Bhutan).

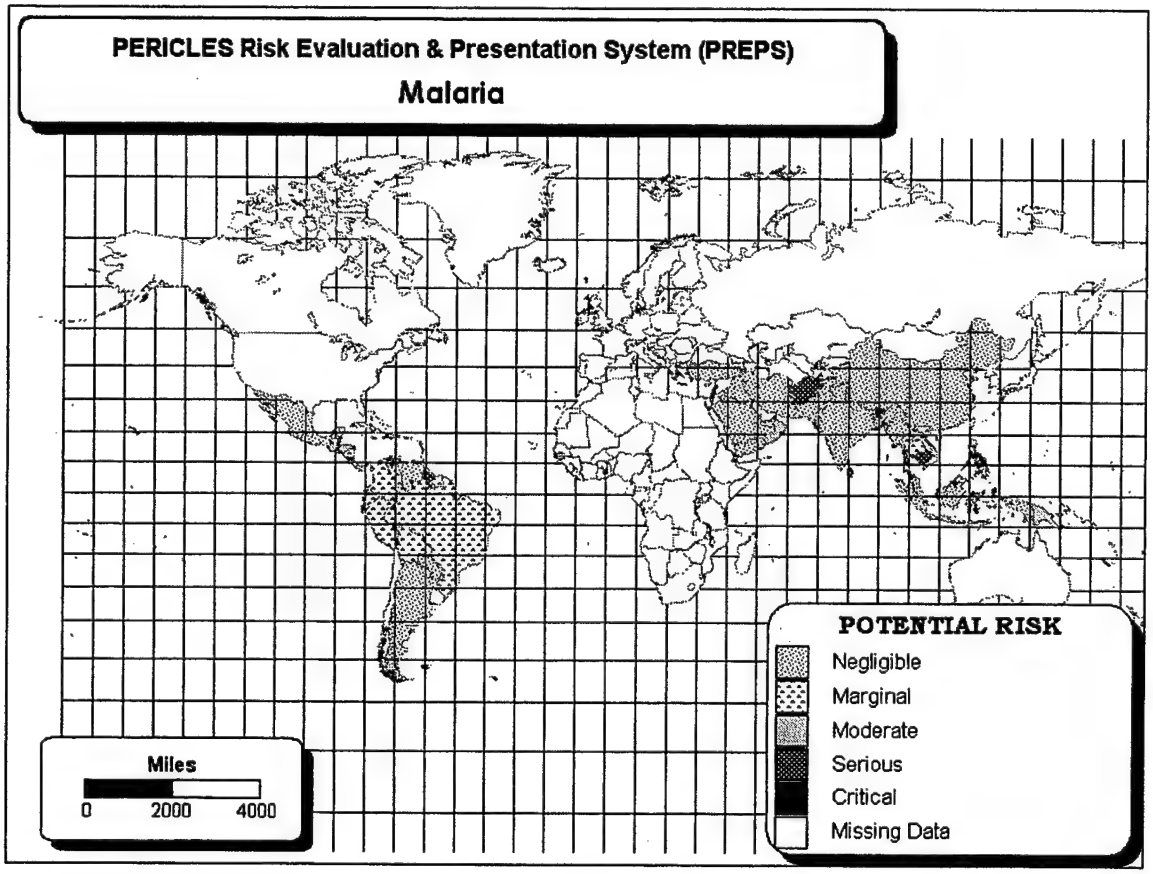

Figure 2-4. Incidence of Cases of Malaria

(4) HIV-1 SEROPREVALENCE. Incidence rates of HIV are difficult to obtain. "Nearly every country initially denied or covered up the presence of the HIV virus within its borders. Even now, at least ten nations known to be in the midst of HIV epidemics refuse to

cooperate with WHO, deliberately obfuscating incidence reports or declining to provide any statistics."[8] HIV is particularly important because it affects the immune system, very often leading to additional diseases. "Anything that reduces the effectiveness of the body's immune system and general level of health makes it easier for the HIV virus to enter the bloodstream and infect a person. These 'co-factors' include malnutrition, endemic diseases, lack of sanitation and potable water, the inability to receive or understand messages about behavioral change, and lack of resources to make the changes."[9] HIV is of additional importance because of its potential economic effects on the nations. "Because of the age group affected, HIV is having an economic impact out of proportion to the numbers of people dying. It causes illness, disability, and death among employees and families. Worker productivity declines, firms have higher medical costs, and they eventually lose staff with valuable training and skills. At the same time, as more of the population becomes ill and personal income drops, consumer markets shrink."[10]
HIV-1 seroprevalence reflects the estimated rate of infection in each country's over-15 population. Data shown in Table 2-6 is extracted from the World Bank data base for 1994.

Table 2-6. HIV-1 Seroprevalence (incidence per 100 adults)

Indicator	Range	Number of countries
1	<0.56	95
2	0.56-1.80	18
3	1.81-5.10	16
4	5.11-11.05	10
5	>11.05	5
Total		144

Figure 2-5 displays the HIV-1 seroprevalence data on a map. Five states in Africa (Malawi, Uganda, Zambia, Zimbabwe, and Botswana) have seroprevalence rates of over 10 percent.

[8] Garrett, Laurie: "The Return of Infectious Diseases," Foreign Affairs, Jan/Feb 96, pp 66-79.

[9] Whitehead, Alan.

[10] Bridging the Gaps, p 30.

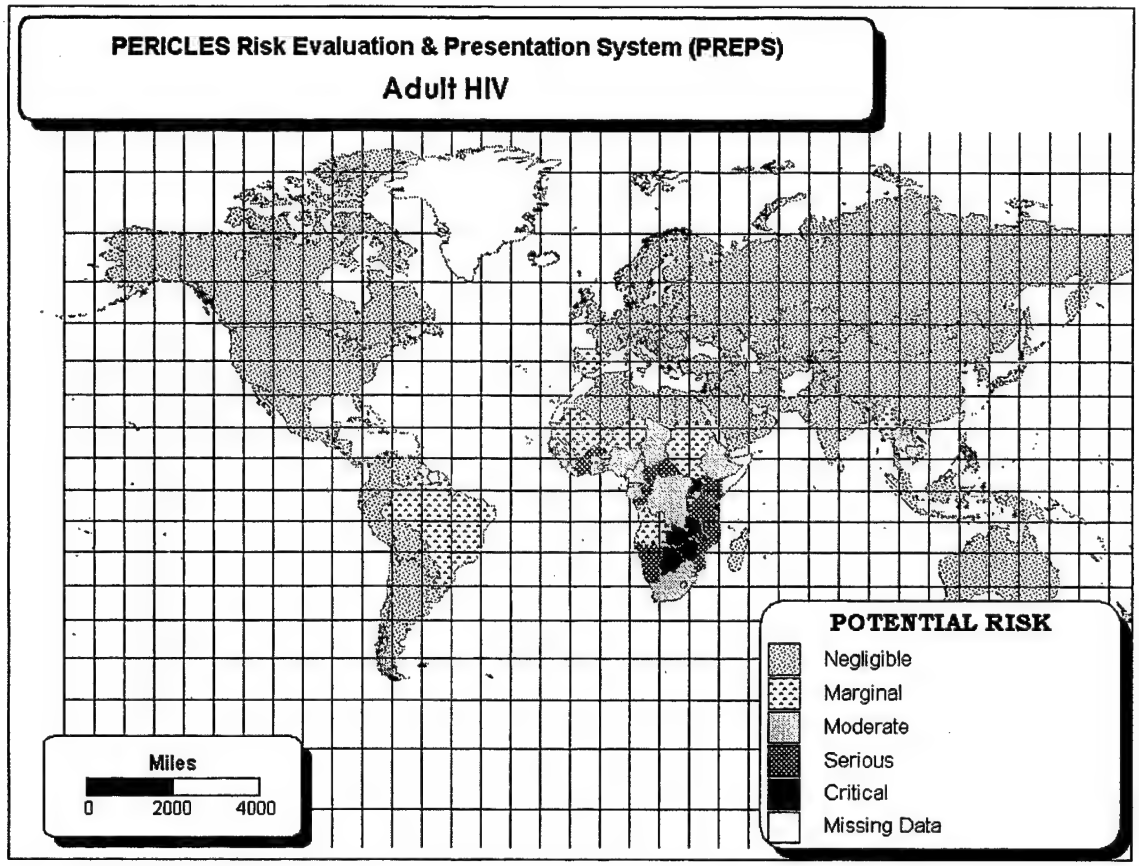

Figure 2-5. Adult HIV-1 Seroprevalence

(5) Accident/Injury. In a recent article, Christopher Murray and Alan Lopez argue for the development of a new public health factor--Disability-Adjusted Life Year (DALY). This factor is defined as "sum of years lost because of premature mortality and years of life lived with disability adjusted for the severity of disability."[11] Dr. Nang at the US Army Center for Health Promotion and Preventive Medicine (CHPPM) recommended to the HARPI team that "injuries and accidents" be included as a factor in this study. For purposes of this study, this factor is represented by mortality based on injuries and accidents data extracted from the World Bank data base. Table 2-7 summarizes that data for 1985-1990.

[11] Murray, Christopher J. L. and Alan D. Lopez "Evidence-Based Health Policy—Lessons from the Global Burden of Disease Study" Science, Vol. 274, 1 Nov 1996, p 740-3.

Table 2-7. Mortality Rate due to Accidents and Injuries (per 100,000 population)

Indicator	Range	Number of countries
1	<37.5	3
2	37.6-50.5	11
3	50.6-61.4	9
4	61.5-85.0	12
5	>85.0	10
Total		45

Figure 2-6 displays the accident/injury factor data on a map. Seven of the 10 countries rated in the worst quintile are in the Former Soviet Union (the other 3 are Chile, China, and Mexico).

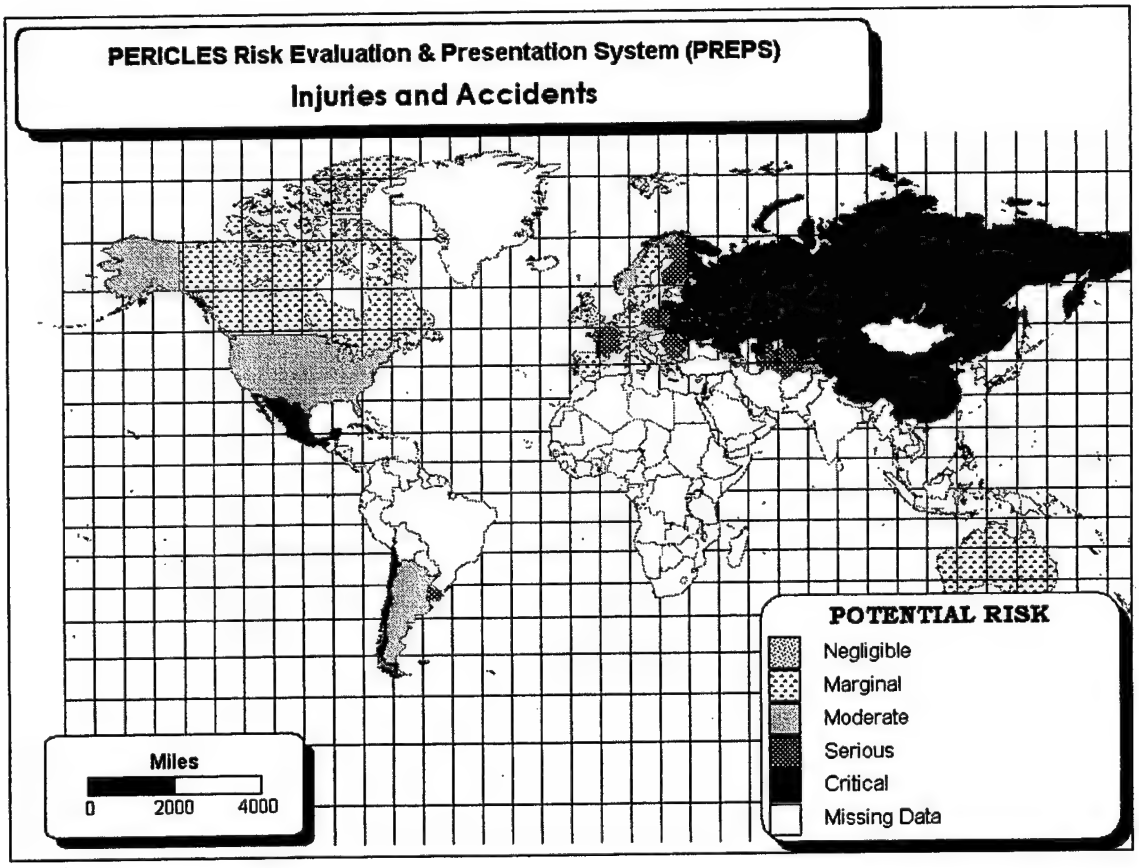

Figure 2-6. Mortality Rate due to Accidents and Injuries

c. Public Health Capabilities. The following paragraph summarizes the global public health capabilities as portrayed by data included in the 1995 United Nations Human Development Report and the World Bank 1997 World Development Indicators. Table 2-8 reflects the six areas considered. As governments become more democratic, the requirement increases to respond to the public health challenges that face these nations. "In a democratic setting ... health and other measures require popular support. Moreover, distortions cannot be concealed; they must be corrected. In the future, it will therefore not be possible to dissociate public health policy from the overall political and economic setting."[12] Data for these factors is at Appendix C on pages C-5 through C-9. The corresponding ratings are in columns 10 through 15 at Appendix D on pages D-2 through D-6.

Table 2-8. Public Health Response Capabilities

Access to Sanitation
Access to Safe Water
Access to Health Facilities
Access to Physician
Access to Nutrition
Access to Education

(1) Access to Sanitation (percent of population). Table 2-9 presents the 1994-1995 access to sanitation data for the 134 countries for which the World Bank published data. This factor refers to the "share of the population with at least adequate excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta .... Suitable facilities range from simple but protected pit latrines to flush toilets with sewerage. To be effective, all facilities must be correctly constructed and properly maintained."[13] The WHO goal for the year 2000 is that at least 75 percent of the population of each country will have access to sanitation. Only 37 percent (49 countries) of the nations reporting met the WHO goal. Note that the lack of access to sanitation frequently can lead to diarrhea which can then lead to increased child mortality and decreased life expectancy. For example, Guinea, where only 6 percent of the population has access to sanitation, has a life expectancy of 44.5 and child mortality of 220 per 1,000 live births (both high in the worst category).

[12] Bridging the Gaps, p 82.

[13] World Development Indicators, p 81.

Table 2-9. Access to Sanitation (percent with access)

Indicator	Range	Number of countries
1	>83	42
2	63-83	26
3	46-62	25
4	28-45	19
5	<28	22
Total		134

Figure 2-7 presents the same data on a map. Note that the majority of countries with the poorest rating are in Africa (14 out of 22), accompanied by Nepal, Haiti, Bhutan, Cambodia, China, Vietnam, Uzbekistan, and Papua New Guinea.

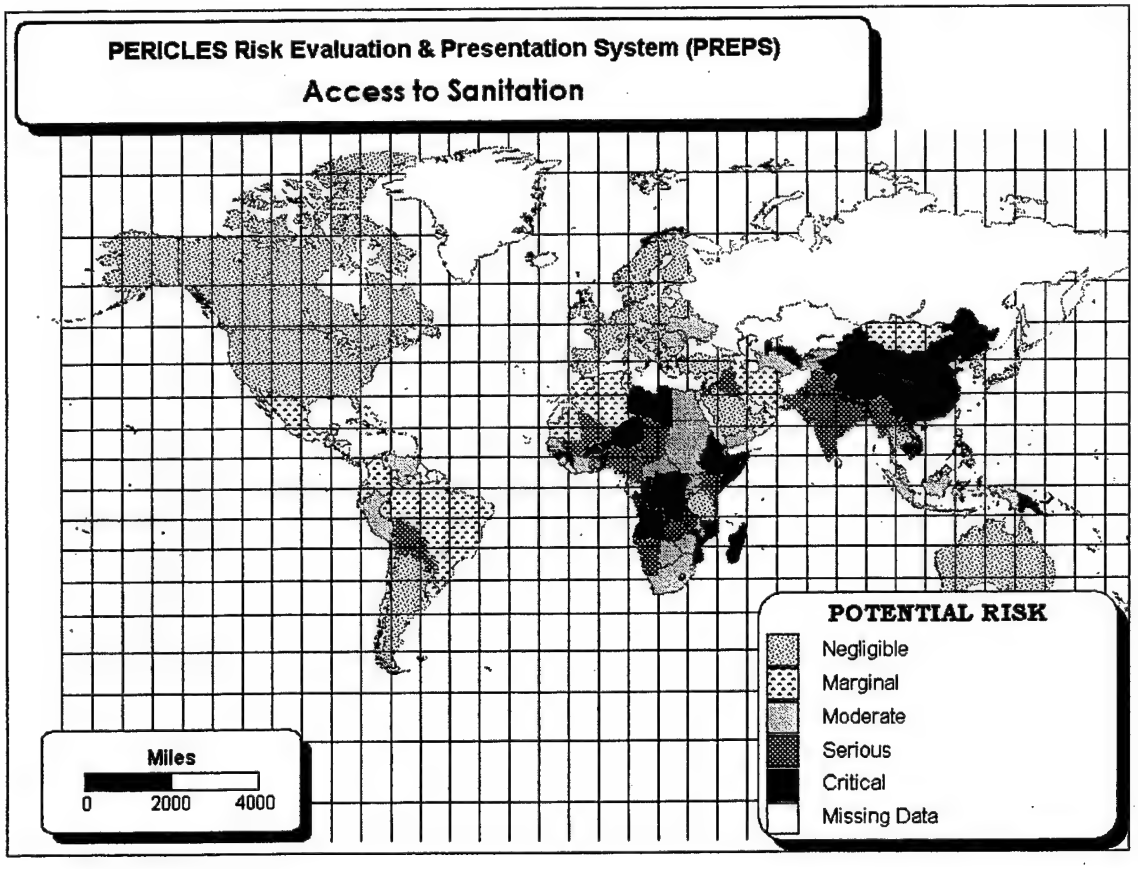

Figure 2-7. Access to Sanitation (percent)

(2) Access to Safe Water (percent of population). Reports from the Gulf War indicate that during the first week of the conflict, both sewage plants in Baghdad stopped functioning due to lack of electricity and that one of the plants was completely destroyed by bombing later on. This resulted in a considerable amount of raw sewage being discharged into the Tigris river, polluting much of the drinking water in Southern Iraq.[14] The UN reported that in 1992, China purchased 26 combat aircraft from Russia which, for the same cost, could have provided safe water for 140 million people without safe water.[15] Table 2-10 presents the 1994-1995 access to safe water data for the 137 countries for which the World Bank published data. The World Bank defines this factor as "the share of the population with reasonable access to an adequate amount of safe water (including treated surface water and untreated but uncontaminated water, such as from springs, sanitary wells, and protected bore holes). In urban areas, the source may be a public fountain or stand post located not more than 200 meters away. In rural areas, the definition implies that members of the household do not have to spend a disproportionate part of the day fetching water. An adequate amount of water is that needed to satisfy metabolic, hygienic, and domestic requirements, usually about 20 liters of safe water per person per day."[16] The WHO goal for the year 2000 is that at least 85 percent of the population of each country will have access to safe water. Only 35 percent (48 countries) of the nations reporting met the WHO goal.

Table 2-10. Access to Safe Water (percent of population)

Indicator	Range	Number of countries
1	>85	48
2	68-85	25
3	52-67	29
4	36-51	19
5	<36	16
Total		137

Figure 2-8 presents the same data on a map. The majority of the nations in the fifth quintile are in Africa but are accompanied by Paraguay, Uruguay, and Haiti in the Western Hemisphere. Four countries (Paraguay, Cambodia, Afghanistan, and Central African Republic) reported that less than 25 percent of their populations had access to safe water.

[14] As reported in FitzSimons, D. W. and A. W. Whitehead: "Conflict, War and Public Health," Research Institute for the Study of Conflict and Terrorism, London, Nov/Dec 1994.

[15] United Nations Human Development Report 1994 [UNHDR 1994], Oxford University Press, New York, 1994.

[16] World Development Indicators, p 81.

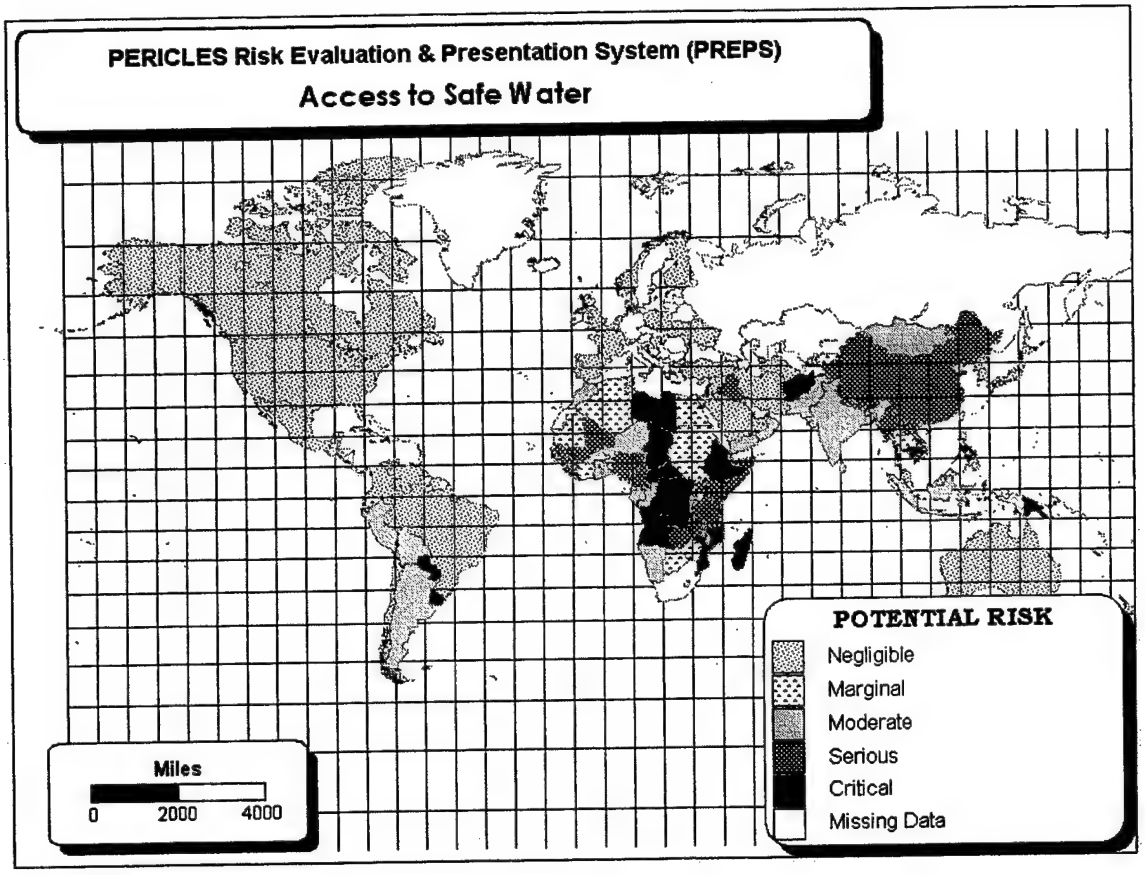

Figure 2-8. Access to Safe Water

(3) Access to Health Facilities. The goal of the WHO is to have health services available to the population within a 1-hour journey. Health care facilities provide primary care and are responsible for the success of the immunization programs. FitzSimons reports on the fact that while nations are improving access to health facilities, these services are often destroyed by antigovernment forces. "Health facilities and hospitals are ... likely to be damaged or destroyed. In some conflicts they are actually targeted. In Mozambique in the years immediately after independence, the government developed a network of health posts and clinics. They were targeted by the Renamo antigovernment rebels, their view being that destruction of these facilities would reduce government control and support. The recent ethnic clashes in northern Ghana saw a similar pattern of destruction."[17] Table 2-11 presents the 1993 access to health facilities data for the 141 countries for which the World Bank published data. This factor represents "the share of the population covered for treatment of common diseases and injuries, including availability of essential drugs on the national list within one hour's walk or travel."[18]

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[17] FitzSimons, pp 23-24.

[18] World Development Indicators, p 81.

Table 2-11. Access to Health Facilities (percent of population)

Indicator	Range	Number of countries
1	>89	63
2	73-89	31
3	55-72	20
4	32-54	16
5	<32	11
Total		141

Figure 2-9 presents the same data on a map. The majority of the countries in the fifth band are in Africa (9 out of 11), accompanied by Nepal and Afghanistan.

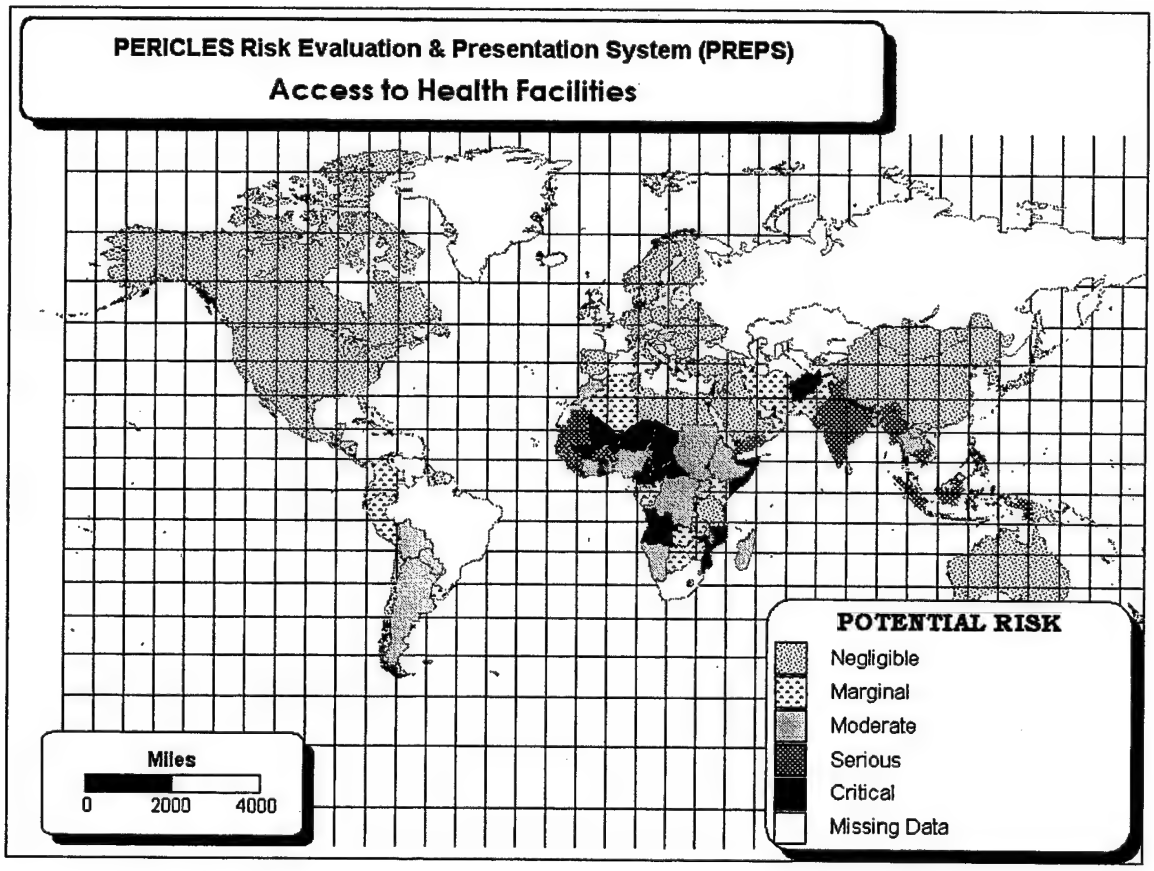

Figure 2-9. Access to Health Facilities

(4) Access to Physicians: Population per Doctor. Table 2-12 presents the 1993 population-per-doctor data for the 159 countries for which the World Bank published data. For purposes of this factor, physicians are "graduates of any facility or school of medicine who are working in the country in any medical field (practice, teaching, research)."[19]

Table 2-12. Access to Physicians: Population per Doctor

Indicator	Range	Number of countries
1	<3,457	99
2	3,457-9,687	24
3	9,688-20,173	22
4	20,174-33,651	10
5	>33,651	4
Total		159

Figure 2-10 presents the same data on a map. All the 14 lowest-ranked countries are in Africa.

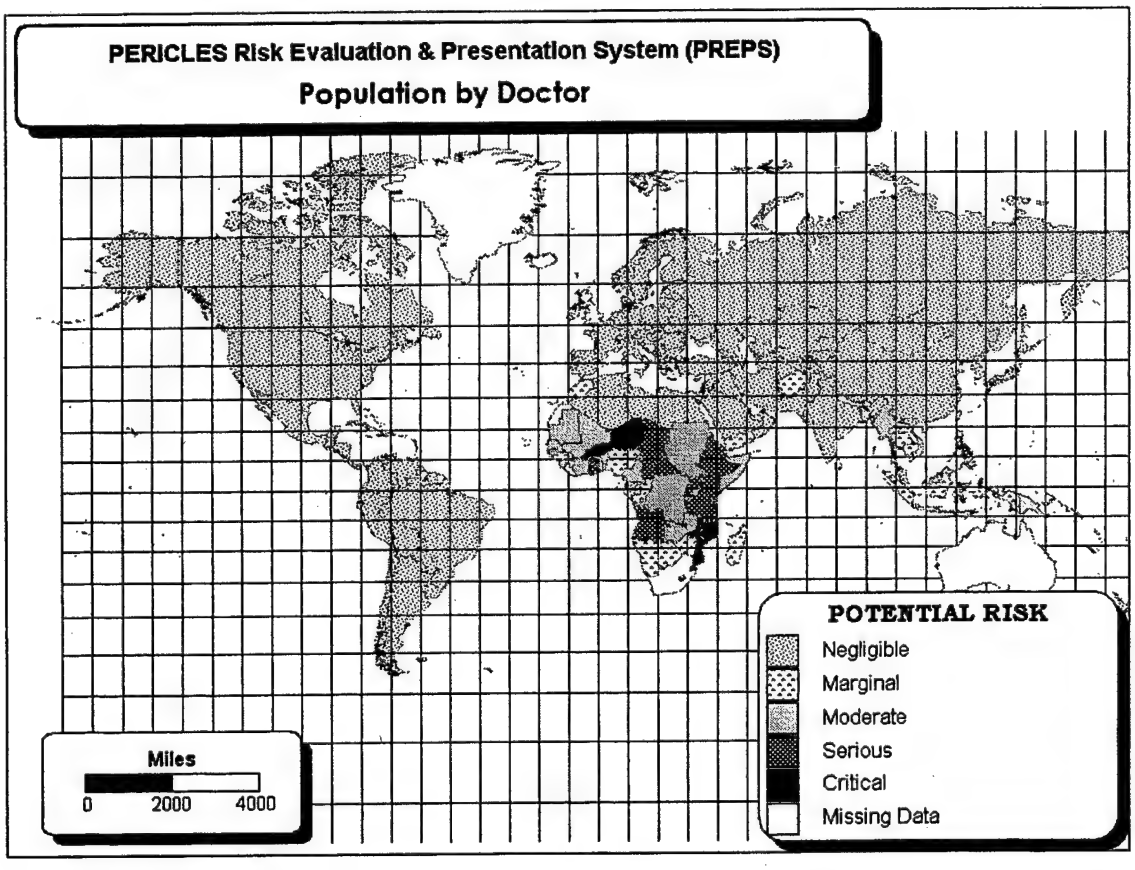

Figure 2-10. Access to Doctors: Population per Physician

[19] World Development Indicators, p 77.

(5) Access to Nutrition. Conflict is a major contributor to the disruption of food production as well as food distribution. Malnutrition predisposes a population to disease. "Food security ... represents the ability of ... populations to obtain and utilize adequate food for a healthy life."[20] The rankings were developed by referring to the United Nations Human Development Report[21] where the section on food security for developing nations reports caloric supply as a percentage of requirement. These figures were translated into a range of requirements from 2,119 for Mongolia to 2,638 for Uruguay. The average for all nations was 2,344, close to the quoted United Nations "basic minimum" of 2,300 calories for all nations overall.[22] These standards were selected as end points for the indicators of the food supply factor. Those countries whose actual caloric intake exceeded the highest requirement observed were in the top level. Those countries whose actual supply fell between the average requirement and the highest requirement were rated in the next band. Countries whose actual caloric supply fell between the lowest requirement and the average requirement were in the third quintile. The UNHCR uses a figure of 1,947 calories per person per day as a goal for the refugee camps under its management. Therefore, 1,947 was used as the delimiter between bands 4 and 5. These criteria led to the distribution shown in Table 2-13. The rankings were based on the 1992 "daily calorie supply per capita" data for the 108 countries for which the United Nations published data.

Table 2-13. Access to Nutrition: Calories per Capita

Indicator	Range	Number of countries
1	>2638	36
2	2345-2638	21
3	2120-2344	25
4	1947-2119	10
5	<1947	16
Total		108

Figure 2-11 presents food intake data on a map. Seventy-five percent of the 16 countries in the fifth band are in Africa.

[20] Mock, Nancy: "Public Health Crisis Prevention, Mitigation, and Recovery: Linking Relief and Development," draft, March 1996, p 28.

[21] United Nations Human Development Report 1992, Oxford University Press, New York, 1992.

[22] UNHDR 1994, p 27.

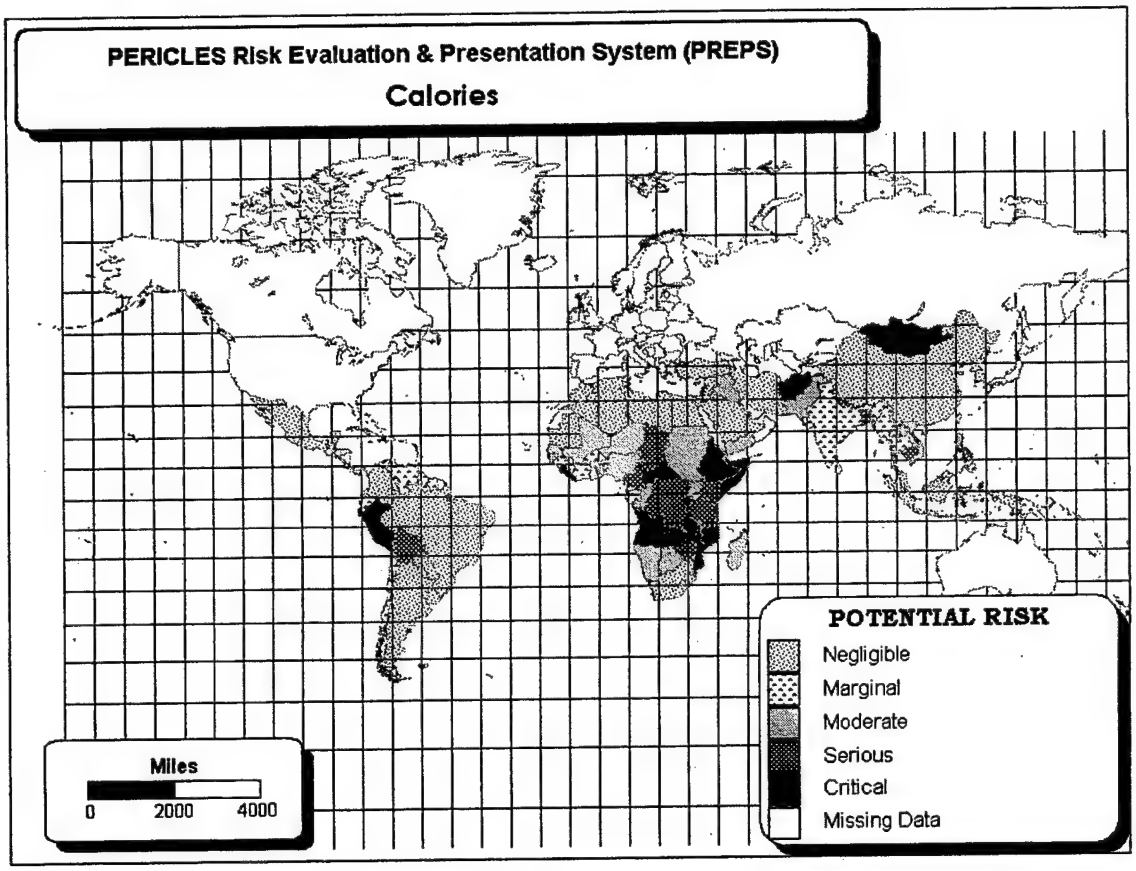

Figure 2-11. Access to Nutrition: Calories per Capita

(6) Access to Education. Table 2-14 presents the 1992 adult literacy data for the 173 countries for which the United Nations published data. The World Health Organization reports that "the global situation with regard to literacy is improving, but this improvement is not shared equally. Illiteracy, common among women and the poor, continues to impede health and social development. Overall adult literacy is expected to increase to about 80% by the end of the century, although for the least developed countries a rate of only 50% is projected."[23] Note the importance of focusing on target population groups in addition to overall national averages.

Table 2-14. Access to Education: Adult Literacy (percent)

Indicator	Range	Number of countries
1	>88	78
2	74-88	31
3	59-73	20
4	42-58	18
5	<42	26
Total		173

[23] Bridging the Gaps, p 41.

Figure 2-12 presents the same data on a map.

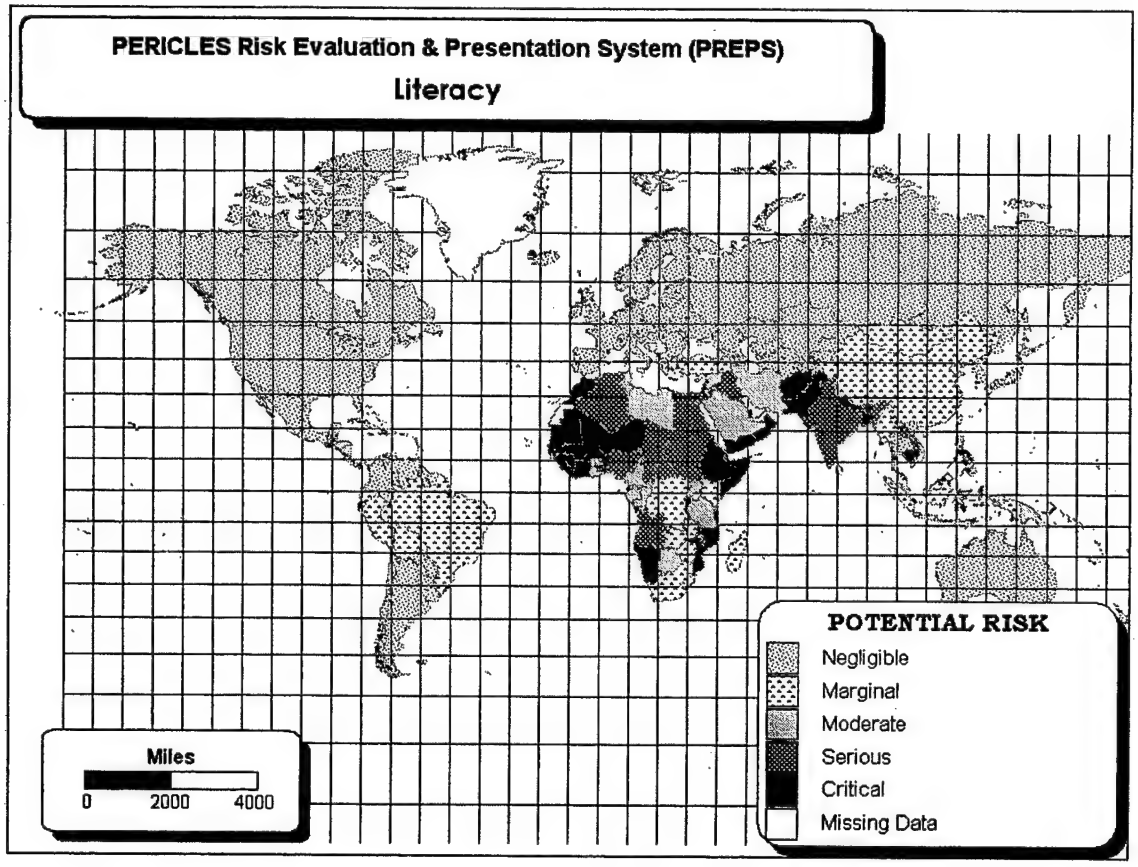

Figure 2-12. Access to Education: Adult Literacy

d. Correlation Analysis

(1) Challenge Factors. Public health factors were correlated with each other in order to see the interrelationships among the factors. Table 2-15 summarizes the results of correlating the public health challenge factors. The only strongly correlated public health challenge factors were child mortality and life expectancy (-0.945--not unexpectedly, a decrease in a country's child mortality correlated strongly with an increase in that country's overall life expectancy). The low correlation between the child mortality and the HIV/AIDS factors was somewhat surprising. This may be due to the paucity of timely data. "Infant and child mortality gains are being erased by the HIV epidemic in some cases and projections suggest that HIV will have a dramatic effect on infant and child mortality in the near future."[24]

[24] Mock, p 9.

Table 2-15. Correlation of Public Health Challenge Factors

	Child mortality	Life expectancy	Malaria	HIV-1 seroprevalence	Accidents/ injuries
Child mortality	--	-0.945	0.057	0.617	0.398
Life expectancy	-0.945	--	-0.285	-0.625	-0.596
Malaria	0.057	-0.285	--	0.265	No data
HIV/AIDS	0.617	-0.625	0.265	--	-0.271
Accidents/injuries	0.398	-0.596	No data	-0.271	--

(2) Capability Factors. Table 2-16 summarizes the results of correlating the public health capability factors. All the public health capability factors were fairly strongly correlated. The strongest correlation was between access to sanitation and access to safe water with a correlation of 0.748. Note the correlation of access to health facilities with access to doctors (-0.684) and access to education (0.697).

Table 2-16. Correlation of Public Health Resource Capability Factors

Access to	Sanitation	Safe water	Health facilities	Pop/ doctor	Nutrition	Education
Sanitation	--	0.748	0.593	-0.571	0.468	0.628
Safe water	0.748	--	0.666	-0.616	0.627	0.611
Health	0.593	0.666	--	-0.684	0.582	0.697
Pop/doctor	-0.571	-0.616	-0.684	--	-0.630	-0.700
Nutrition	0.468	0.627	0.582	-0.630	--	0.525
Education	0.628	0.611	0.697	-0.700	0.525	--

(3) Challenge and Capability Factors. Table 2-17 summarizes the results of correlating the public health challenge factors (the columns) with the public health capability factors (the rows). All six capability factors correlate with child mortality--i.e., improvements in access to sanitation, safe water, health facilities, nutrition, and education result in a decrease in child mortality as do decreases in population per doctor. Increases in life expectancy correlated with all six capability factors. Note the correlation of access to education with decreased child mortality (-0.823) and increased life expectancy (0.808). Neither the malaria nor the HIV/AIDS factors exhibited strong correlation with any of the capability factors.

Table 2-17. Correlation of Public Health Capability and Challenge Factors

	Child mortality	Life expectancy	Malaria	HIV-1 seroprevalence	Accidents/ injuries
Sanitation	-0.718	0.752	-0.288	-0.357	-0.345
Water	-0.706	0.751	-0.275	-0.418	-0.368
Health facilities	-0.695	0.740	-0.055	-0.421	-0.133
Pop/doctors	0.810	-0.808	0.433	0.700	0.080
Nutrition	-0.617	0.660	-0.260	-0.514	-0.364
Education	-0.823	0.808	-0.162	-0.482	-0.008

CHAPTER 3

RESULTS

"Long-simmering regional concerns, masked by forty years of East-West competition, now compete for world attention. Today's challenges are more likely to result from demographic trends and social turmoil than from confrontation with a well-armed adversary. Within the changed environment, national and international economic issues are of ever increasing importance to our long-term security and prosperity. Tomorrow's challenges, however, remain less well defined."[1]

Admiral Paul David Miller
Supreme Allied Commander, Atlantic, 1992

3-1. OVERVIEW. In his monograph, Admiral Miller emphasizes the importance for the US to identify the new challenges that currently face the US and to prepare to respond to them. President Clinton, in a Presidential Decision Directive, tasked DOD with identifying and assessing the specific public health challenges facing each nation and each country's capabilities to respond to those challenges.

3-2. COMPOSITE ASSESSMENTS. The following paragraphs will demonstrate the derivation of three composite assessments for each of the countries of the world. The first will be a composite rating of the status of the public health challenges facing these nations. The second will be a composite rating of each nation's capabilities to contend with those challenges. The final composite assessment combines the first and the second in order to provide an overall illustration of the balance achieved between a nation's challenges and capabilities.

a. Public Health Challenge Factor Composite. Table 3-1 summarizes the public health challenges by level of public health instability. An indicator is assigned to a state only if at least three challenge factors have scores. A composite rating was determined for each country by averaging the scores of its component challenge factors. The challenge score for each country is in column three at Appendix D on pages D-2 through D-6.

Table 3-1. Public Health Challenges

Indicator	Number of countries
1	44
2	53
3	14
4	22
5	5
Total	138

[1] Miller, Paul David: Both Swords and Plowshares, Institute of Foreign Policy Analysis, Cambridge, Massachusetts, 1992, p 12.

Figure 3-1 displays the public health challenges on a map. The preponderance of the countries with public health challenges is in Africa and Asia (Burma, Laos, Papua New Guinea, and Cambodia). The US is rated in the second band because of a relatively high injury and accident mortality rate (58 per 1,000). Rwanda, Sierra Leone, Uganda, Zambia, and Malawi have the greatest public health challenges. All five have a high HIV-1 seroprevalence and life expectancy of under 50. Malawi is rated as worst as evidenced by a child mortality rate of 225 per 1,000.

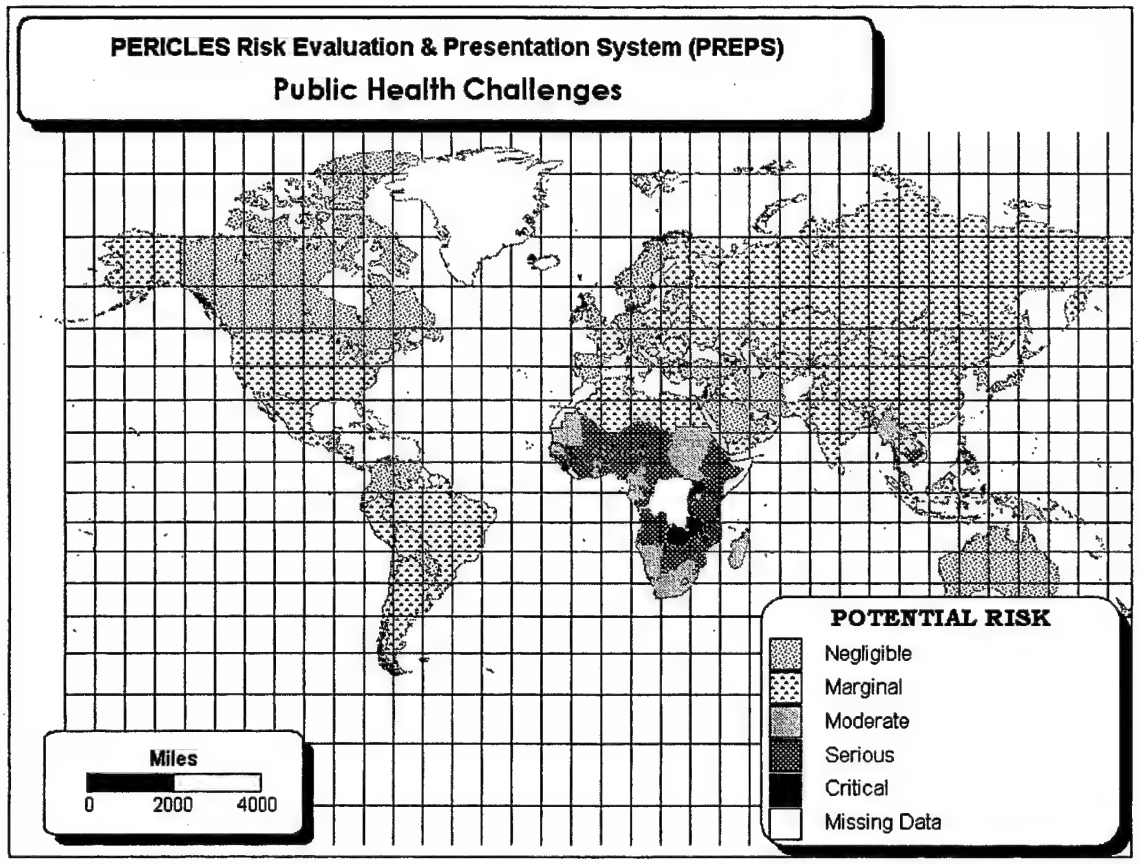

Figure 3-1. Public Health Challenges

b. Public Health Capability Factor Composite. Table 3-2 summarizes the public health capabilities. An indicator is assigned to a state only if at least four capability factors have scores. A composite rating was determined for each country by averaging the scores of its component capability factors. The capability score for each country is in column 9 at Appendix D on pages D-2 through D-6.

CHAPTER 3

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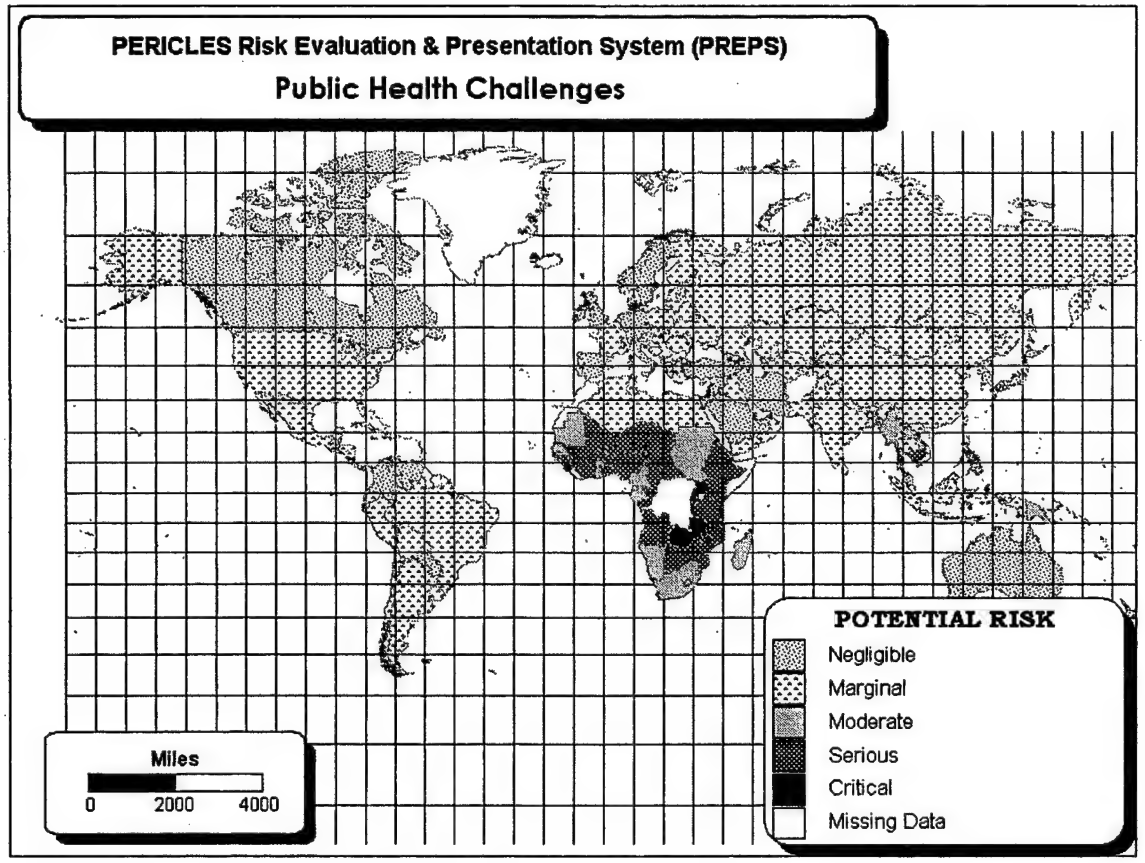

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Table 3-2. Public Health Capabilities

Indicator	Number of countries
1	60
2	33
3	36
4	18
5	6
Total	153

Figure 3-2 displays the public health capabilities on a map. States in bands 4 and 5 in the area of public health capabilities are clustered in Africa with the exception of Afghanistan, Bhutan, Cambodia, and Haiti. Note that the UN and the World Bank do not report data for Russia. Six states are in the fifth quintile in their capabilities to respond to the public health challenges--Niger, Afghanistan, Angola, Somalia, Ethiopia, and Mozambique. Mozambique had the worst score in all six national capabilities.

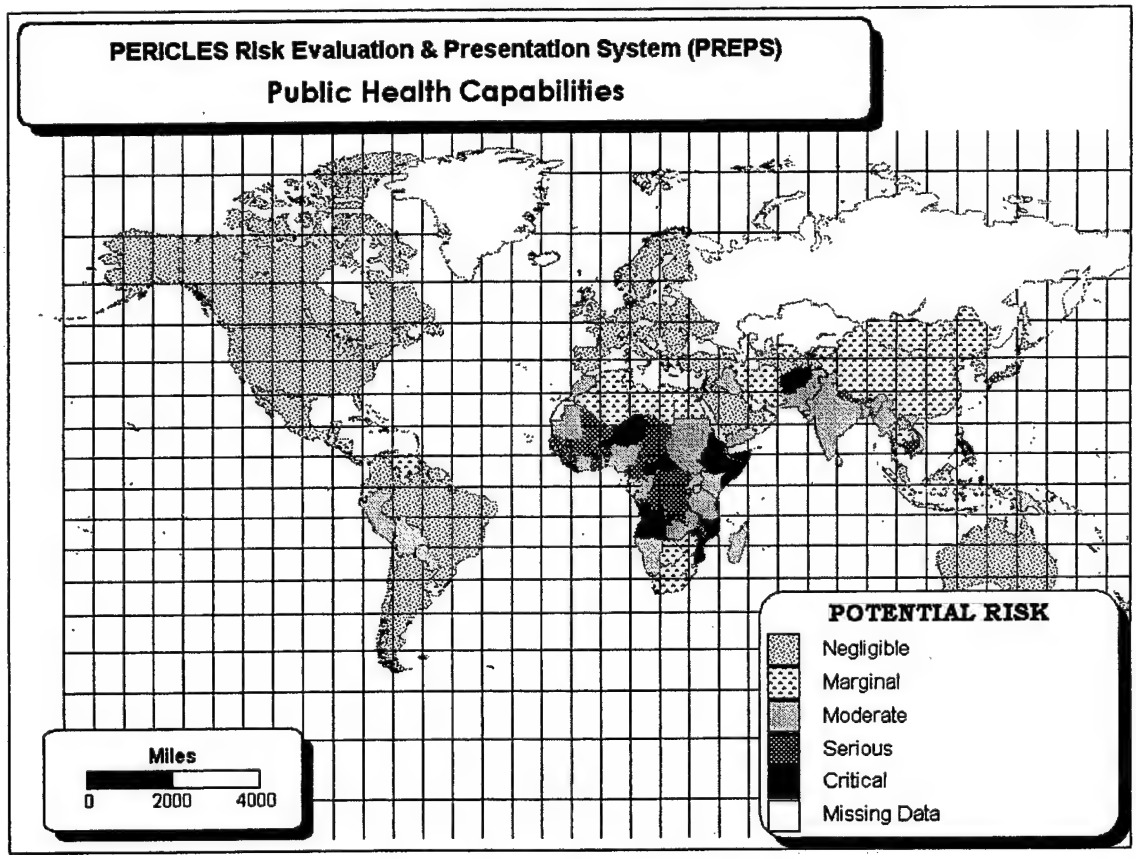

Figure 3-2. Public Health Capabilities

c. Public Health Risk Assessment Composite. Table 3-3 summarizes the public health risk assessment situation. This is a combination of public health challenge and state response capabilities. It is the average of a country's challenge and capability factor ratings. The overall risk assessment for each country is in column two at Appendix D on pages D-2 through D-6.

Table 3-3. Public Health Risk Assessment

Indicator	Number of countries
1	54
2	41
3	25
4	25
5	4
Total	149

Figure 3-3 displays the public health risk assessment on a map. The four nations rated in the fifth band are Afghanistan, Ethiopia, Somalia, and Mozambique, all of whom have limited capabilities to respond to the public health situation. Zambia and Uganda have noteworthy public health challenges, yet, because of reasonably effective state capabilities to respond, are rated in the second quintile for overall public health status.

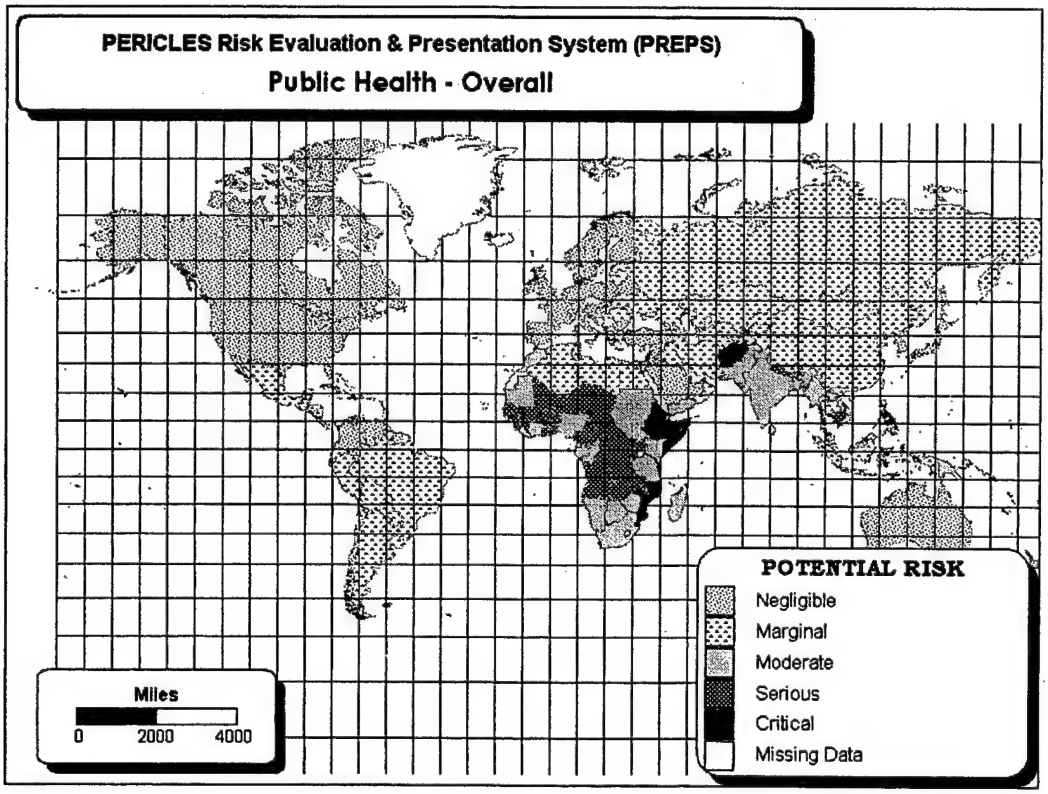

Figure 3-3. Public Health Risk Assessment

CHAPTER 4

KEY FINDINGS

This chapter discusses the key findings of the analysis. Public health challenges are presented first, followed by response capabilities, and then the overall public health status of the nations of the world.

a. Five factors were used to evaluate public health challenges--under age 5 child mortality, life expectancy, incidence of malaria, HIV-1 seroprevalence, and accident/injury rates. For child mortality, the 14 countries with the poorest scores are in Africa, 6 with mortality rates of over 20 percent. Life expectancy is decreasing in a number of countries. For example, average life expectancy for males in Russia in 1975 was 69; by 1995, the average had declined to 57. While 29 countries (17 percent) had a life expectancy of over 75 in 1992, 29 percent had a life expectancy of under 60. For example, there is a difference of over 40 years between the life expectancy for Japan (79.5) and Sierra Leone (39). Malaria was used as a factor because it is an important obstacle to development. Two countries--Cambodia and Bhutan--had the highest 1991 malaria incidence data. There is a high incidence of malaria in Latin America, probably linked to road building, mining, logging, and irrigation projects. Five states had severe HIV-1 seroprevalence data (Botswana, Malawi, Uganda, Zambia, and Zimbabwe). A senior analyst at the Center for Health Promotion and Preventive Medicine identified accident/injury rates as key to instability. Of the nations with the 10 highest rates, 7 are in the Former Soviet Union. Overall in the category of challenges, five states scored particularly poorly--Rwanda, Sierra Leone, Malawi, Uganda, and Zambia. The US has a relatively high incidence of accidents and injuries and thus appears near the mid-point of the worldwide challenge ratings.

b. Six factors were used to evaluate the capability of a state to respond to the public health challenges--access to sanitation, access to safe water, access to health facilities, population per physician, nutrition, and literacy. Of the 22 countries with the lowest access to sanitation, 14 are in Africa. There is a parallel between a low access to sanitation, high child mortality, and low life expectancy. For example, Guinea, with a 6 percent access to sanitation, experiences a life expectancy of 44.5, and a child mortality rate of 220 children per thousand. In spite of the World Health Organization goal that 85 percent of the population have access to safe water, only 35 percent of nations reported meeting that goal. In the Western Hemisphere, Paraguay, Uruguay, and Haiti have low access to safe water. Eleven states report that under 35 percent of their respective populations have access to health facilities within a 1-hour journey. Health facilities are important to the status of public health in a country in that they provide primary care, immunizations, treat common diseases and injuries, and provide common drugs. Health care facilities are often the target of antigovernment groups. Six states (Burkina Faso, Chad, Ethiopia, Malawi, Mozambique, and Niger) have populations of over 30,000 per physician. Malnutrition predisposes a population to disease; therefore, calories per capita was chosen as a factor. Sixteen nations reported figures below the UNHCR minimum goal for refugee camps under its management. Illiteracy, particularly among women and the poor, impedes health and social development. Twenty-six states reported literacy of less than 42 percent. Overall for the

category of public health capabilities, 6 countries stand out as being particularly unresponsive. These are Afghanistan, Angola, Ethiopia, Mozambique, Niger, and Somalia.

c. The 11 factors considered were combined to develop a public health risk assessment. Nineteen countries from the former Soviet Union/Warsaw Pact were scored. Of these, 9 were rated in the best group, and 10 were rated in the next-to-best group. Twenty-four western industrialized nations were also in the best group. These were all the western European nations, plus Cyprus, Turkey, and Israel, as well as the United States, Canada, Japan, Australia, and New Zealand. Twenty-six Latin American countries were rated, and only Guatemala (third band) and Haiti (fourth band) failed to appear in either of the best two quintiles. Arab nations also were in the top two bands except for three mid-level nations (Morocco, Sudan, Yemen) and one fourth band (Somalia). Twenty-six Asia/Pacific countries were scored. Both Koreas, Hong Kong, Singapore, Malaysia, and Fiji were in the best group. Afghanistan was in the poorest group, and the remainder were distributed among the center three bands. In sub-Saharan Africa, only Mauritius received a top rating; Ethiopia and Mozambique scored very poorly, and all others were either in the third or fourth bands.

APPENDIX A

QRA CONTRIBUTORS

A-1. QRA DIRECTOR

Mr. J. Theodore Ahrens, Resource Analysis Division

A-2. INTERNAL CONTRIBUTORS

Ms. Tina Davis
Ms. Nancy Lawrence
Mr. Neal Siegel
Mr. George Peery
Ms. Judy Rosenthal

A-3. EXTERNAL CONTRIBUTORS

Dr. Deborah Keimig, Armed Forces Medical Intelligence Center
Major (Dr.) Roberto Nang, US Army Center for Health Promotion and Preventive Medicine
Mr. William Lyerly, US Agency for International Development

APPENDIX B

REQUEST FOR ANALYTICAL SUPPORT

PART 1

REQUEST FOR ANALYTICAL SUPPORT

1. Performing Directorate/ Division:		2. Account Number: 97016	
3. Type Effort (Enter one): Q (S - Study, Q - QRA, P - Project, R - RAA)	Mode (Contract=C)	4. Tasking (Enter one): V (F - Formal Directive, I - Informal, V - Verbal)	
5. Title: Health Assessment Risk -- PERICLES Improvement			
6. Acronym: HARPI	7. Date Request Received:	8. Date Due:	
9. Requester/Sponsor (i.e., DCSOPS): OTSG		10. Sponsor Division (i.e., SSW, N/A)	
11. Impact on Other Studies. QRA, Projects, RAA: None			
12. Product Required: Report			
13. Estimated Resources Required:	a. Estimated PSM: 4.5	b. Estimated Funds: $0	
c. Models Req'd: PERICLES Risk Evaluation Presentation System (PREPS)		d. Other:	

14. Objective(s)/Abstract:
The US Army has been tasked to evaluate the status of public health in foreign countries in response to a Presidential Decision Memorandum. An analytic methodology is required to assess the public health challenges facing each nation and each country's capabilities to respond. This methodology will be used to enhance the US Army's ability to evaluate the risk of instability in foreign countries as a result of the public health situation in that nation. An evaluation is required of the status of public health in each nation using the methodology developed in order to identify countries facing potential crises and to formulate potential US responses.

15. Study Director/POC:	Last Name: AHRENS	First: THEODORE	Date: 7 March 1996
	Signature: T. Theodore Ahrens		Phone#: 295-1056

GO TO BLOCK 20 *If this is A STUDY*. See Tab C of the Study Directors' Guide for preparation of a Formal Study Directive.

PART 2

16. Background/Statement of Problem*: The Army requires a quick turnaround decision support system which will quantify public health risk in foreign countries and relate that risk to the overall risk of instability in that country.

17. Scope of Work*:
1. Timeframe of Analysis: FY 1996-2003
2. Consider selected criteria which evaluate a country's public health challenges and capabilities.

18. Issues for Analysis*: 1. Identify and evaluate public health determinants which could lead to country risk.
2. Assess public health situation in foreign countries using the methodology developed in this effort.
3. Correlate public health ~~criteria to other~~ factors (e.g. economic) used to evaluate country risk in nations.

19. Milestones/Plan of Action*:

20. Division Chief Concurrence:	Joe Gordon	Date: 13 Mar 96
21. Sponsor (COL/DA Div Chief) Concurrence:	James L. O'Donnell	Date: 7 Mar 96
22. Sponsor Comments*:		

CAA Form 233 (1 May 95) * Continue on separate sheet Previous editions Obsolete

APPENDIX C

HARPI DATA

This appendix provides a listing of the HARPI data used in the analysis. The first table presents the public health challenges. The data fields are as follows:

Column	Indicator
SHORT_NAME	Country Name
MORT2	Under 5 Child Mortality
LIFEX92	Life Expectancy
MALAR	Incidence of Malaria
HIV	HIV-1 Seroprevalence
INJ2	Accident/Injury Rate

Units are shown in Tables 2-3 through 2-7.

Table C-1. Public Health Challenges

Record #	SHORT_NAME	MORT2	LIFEX92	MALAR	HIV	INJ2
1	Afghanistan		43.5	3170		
2	Albania	37	72.0		0.0	
3	Algeria	42	67.1		0.1	
4	American Samoa					
5	Andorra					
6	Angola	209	46.5		1.0	
7	Anguilla					
8	Antigua		74.0			
9	Argentina	27	72.1	20	0.4	59
10	Armenia	24	72.6		0.0	66
11	Aruba					
12	Australia	8	77.6		0.1	48
13	Austria	7	76.2		0.2	55
14	Azerbaijan	31	70.6		0.0	46
15	Bahamas		73.1			
16	Bahrain		71.6			
17	Baker Island					
18	Bangladesh	115	55.6	50	0.0	
19	Barbados		75.6			
20	Belgium	10	76.4		0.2	68
21	Belize		73.6	1710		
22	Benin	156	47.6		1.2	
23	Bermuda					
24	Bhutan		50.7	11060		
25	Bolivia	96	59.4	630	0.1	
26	Bosnia				0.0	
27	Botswana	74	64.9		18.0	
28	Brazil	57	66.3	930	0.7	
29	Brit. Virgin Is.					
30	Britain	7	76.2		0.1	31
31	Brunei		74.2			
32	Bulgaria	19	71.2		0.0	64
33	Burkina Faso	164	47.4		6.7	
34	Burma	119	57.6	330	1.5	
35	Burundi	162	50.2		2.7	
36	Byelorussia	20	69.8		0.0	90
37	Cambodia	158	51.6	5040	2.0	
38	Cameroon	86	56.0		3.0	
39	Canada	8	77.4		0.2	48

Record #	SHORT_NAME	MORT2	LIFEX92	MALAR	HIV	INJ2
40	Cape Verde		64.7			
41	Cayman Islands					
42	Cen. Afr. Rep.	160	49.4		5.8	
43	Chad	197	47.5		2.7	
44	Chile	15	73.8		0.1	88
45	China	43	68.5	10	0.0	88
46	Christmas Island					
47	Cocos (Keeling)					
48	Colombia	3	69.3	810	0.2	
49	Comoros		56.0			
50	Congo	144	51.3		7.2	
51	Cook Islands					
52	Costa Rica	16	76.3	390	0.5	
53	Croatia	18			0.0	
54	Cuba	10	75.3		0.0	82
55	Cyprus		77.0			
56	Czech Republic	10	71.3		0.0	
57	Denmark	7	75.3		0.2	
58	Djibouti		48.3			
59	Dominica		72.0			
60	Dominican Rep.	44	69.6	10	1.0	
61	Ecuador	45	68.8	920	0.3	
62	Egypt	76	63.6		0.0	
63	El Salvador	42	66.4	120	0.6	
64	Equat. Guinea		48.0			
65	Estonia	16	69.3		0.0	
66	Ethiopia	188	47.5		2.5	
67	Falkland Islands					
68	Faroe Islands					
69	Fiji		71.5			
70	Finland	5	75.7		0.0	76
71	France	9	76.9		0.3	70
72	French Guiana					
73	French Polynesia					
74	Gabon	145	53.5		2.3	
75	Gambia	213	45.0		2.1	
76	Gaza Strip					
77	Georgia	21	72.8		0.0	56
78	Germany	7	76.0		0.1	45
79	Ghana	116	56.0		2.3	
80	Gibraltar					
81	Golan Heights					
82	Greece	10	77.6		0.1	48
83	Greenland					
84	Grenada		70.0			
85	Guadeloupe					
86	Guam					
87	Guatemala	58	64.8	1500	0.4	
88	Guinea	220	44.5		0.6	
89	Guinea-Bissau	233	43.5		3.1	
90	Guyana		65.2	5280		
91	Haiti	101	56.6	430	4.4	
92	Honduras	59	67.7	1960	1.6	
93	Hong Kong	6	78.6		1.6	28
94	Hungary	90	69.0		0.1	
95	Iceland		78.2			
96	India	95	60.4	260	0.4	
97	Indonesia	75	62.7	10	0.0	
98	Iran	59	67.5	210	0.0	
99	Iraq	145	66.0	10	0.0	
100	Ireland	7	75.3		0.1	39
101	Israel	9	76.5		0.1	53
102	Italy	8	77.5		0.3	39
103	Ivory Coast	138	51.0		6.8	
104	Jamaica	15	73.6		0.9	
105	Japan	6	79.5		0.0	41
106	Jarvis Island					
107	Johnston Atoll					
108	Jordan	33	67.9		0.0	

Record #	SHORT_NAME	MORT2	LIFEX92	MALAR	HIV	INJ2
109	Kazakhstan	35	69.6		0.0	103
110	Kenya	90	55.7		8.3	
111	Kirghizia	42	69.0		0.0	95
112	Kiribati					
113	Kuwait	14	74.9		0.1	
114	Laos	147	51.0	1010	0.0	
115	Latvia	20	69.1		0.0	
116	Lebanon	40	68.5		0.1	
117	Lesotho	121	60.5		3.1	
118	Liberia		55.4			
119	Libya	75	63.1		0.1	
120	Liechtenstein					
121	Lithuania	19	70.4		0.0	107
122	Luxembourg		75.7			
123	Macao					
124	Macedonia	31			0.0	
125	Madagascar	127	56.5		0.1	
126	Malawi	225	45.6		13.6	
127	Malaysia	14	70.8	210	0.3	
128	Maldives		62.1			
129	Mali	192	46.0		1.3	
130	Malta		76.1			
131	Marshall Islands					
132	Martinique					
133	Mauritania	158	51.5		0.7	
134	Mauritius	20	70.2		0.1	
135	Mayotte					
136	Mexico	41	70.8	70	0.4	102
137	Micronesia					
138	Midway Islands					
139	Moldavia	26	67.6		0.0	104
140	Monaco					
141	Mongolia	74	63.7		0.0	
142	Montserrat					
143	Morocco	75	63.3			
144	Mozambique	190	46.4		5.8	
145	N. Marianas					
146	Namibia	78	58.8		6.5	
147	Nauru					
148	Nepal	131	53.5	240	0.1	
149	Neth. Antilles					
150	Netherlands	8	77.4		0.0	
151	New Caledonia					
152	New Zealand	9	75.5		0.1	58
153	Nicaragua	61	66.7	690	0.1	
154	Niger	200	46.5		1.0	
155	Nigeria	176	50.4		2.2	
156	Niue					
157	Norfolk Island					
158	North Korea	32	71.1		0.0	
159	Norway	8	76.9		0.1	53
160	Oman	22	69.6	1350	0.1	
161	Pakistan	127	61.5	60	0.1	
162	Palau					
163	Palmyra Atoll					
164	Panama	28	72.8	50	0.6	
165	Papua New Guinea	95	55.8	2290	0.2	
166	Paraguay	52	70.0	80	0.1	
167	Peru	62	66.0	460	0.2	
168	Philippines	53	66.3	530	0.1	
169	Pitcairn Islands					
170	Poland	16	71.1		0.1	80
171	Portugal	11	74.6		0.2	78
172	Puerto Rico	15				59
173	Qatar		70.5			
174	Reunion					
175	Romania	29	69.9		0.0	65
176	Russia	21	67.6		0.0	115
177	Rwanda	200	47.3		7.2	

Record #	SHORT_NAME	MORT2	LIFEX92	MALAR	HIV	INJ2
178	Saint Helena					
179	Saint Lucia		72.0			
180	Saint Pierre					
181	Saint Vincent		71.0			
182	San Marino					
183	Sao Tome		67.0			
184	Saudi Arabia	31	69.7	200	0.0	
185	Senegal	97	49.3		1.4	
186	Seychelles		71.0			
187	Sierra Leone	236	39.0		3.0	
188	Singapore	6	74.8		0.1	39
189	Slovakia	15	70.9		0.0	
190	Slovenia	8			0.0	
191	Solomon Islands		70.4			
192	Somalia		47.0			
193	South Africa	67	62.9		3.2	
194	South Korea	14	71.1		0.0	
195	Spain	9	77.6		0.6	42
196	Sri Lanka	19	71.9	3150	0.1	
197	St. Kitts		70.0			
198	Sudan	109	53.0		1.0	
199	Surinam		70.3	480		
200	Svalbard					
201	Swaziland		57.5			
202	Sweden	5	78.2		0.1	46
203	Switzerland	7	78.0		0.3	
204	Syria	40	67.1		0.0	
205	Tadzhikistan	61	70.2		0.0	53
206	Taiwan					
207	Tanzania	133	52.1		6.4	
208	Thailand	42	69.0	410	2.1	
209	Togo	128	55.0		8.5	
210	Tokelau					
211	Tonga					
212	Trinidad	18	71.6		0.9	
213	Tunisia	50	67.8		0.0	
214	Turkey	63	66.5	20	0.0	
215	Turkmenistan	65	65.0		0.0	68
216	Turks and Caicos					
217	Tuvalu					
218	US Virgin Is.					
219	Uganda	160	44.9		14.5	
220	Ukraine	21	69.4		0.0	93
221	Un.Arab Emirates	19	73.8	210	0.2	
222	United States	10	76.0		0.5	58
223	Uruguay	21	72.5		0.3	67
224	Uzbekistan	48	69.2		0.0	65
225	Vanuatu		65.2	10520		
226	Vatican City					
227	Venezuela	25	71.7	270	0.3	
228	Vietnam	49	65.2	390	0.1	
229	Wake Island					
230	Wallis					
231	West Bank					
232	Western Sahara					
233	Western Samoa					
234	Yemen	145	50.2	210	0.0	
235	Yugoslavia	22			0.1	
236	Zaire		52.0		3.7	
237	Zambia	180	48.9		17.1	
238	Zimbabwe	83	53.7		17.4	

Table C-2 displays the public health response capabilities. The data fields are as follows:

Column	Indicator
SHORT_NAME	Country Name
SANITX	Access to Sanitation
WATERX	Access to Safe Water
HEALTX	Access to Health Facilities
POPDRX	Population per Doctor
CAL92	Calories per Capita
ADLIT92	Adult Literacy

Units are shown in Tables 2-9 through 2-14.

Table C-2. Public Health Capabilities

Record#	SHORT_NAME	SANITX	WATERX	HEALTX	POPDRX	CAL92	ADLIT92
1	Afghanistan		23	29	7692	1523	29.00
2	Albania	100		100	735		85.00
3	Algeria	79		88	1062	2897	57.00
4	American Samoa						
5	Andorra						
6	Angola	16	32	24	23725	1840	43.00
7	Anguilla						
8	Antigua						96.00
9	Argentina	89	64	71	330	2880	96.00
10	Armenia				261		99.00
11	Aruba						
12	Australia	90	95	100			99.00
13	Austria	100		100	231		99.00
14	Azerbaijan				257		96.00
15	Bahamas		90	100	773		98.00
16	Bahrain			100	775		84.00
17	Baker Island						
18	Bangladesh	30	83	74	12884	2019	36.00
19	Barbados		100	100	1123	3223	97.00
20	Belgium	100	92	100	274		99.00
21	Belize		73	75	1562	2670	96.00
22	Benin	22	70	42	14216	2532	33.00
23	Bermuda						
24	Bhutan	13	34	65	11111		39.00
25	Bolivia	44		67	2348	2100	81.00
26	Bosnia						
27	Botswana	55	70	86	5151	2288	67.00
28	Brazil	73	92		844	2824	82.00
29	Brit. Virgin Is.				306		
30	Britain	96	100				99.00
31	Brunei			96	1810	2745	86.00
32	Bulgaria	99		100	315		93.00
33	Burkina Faso	14	56	49	34804	2387	17.00
34	Burma	42		48	12528	2598	82.00
35	Burundi	48	58	80	17153	1941	33.00
36	Byelorussia	100		100	236		98.00
37	Cambodia	14	13	53	9374	2021	38.00
38	Cameroon	40	41	15	11996	1981	60.00
39	Canada	85	100	99	464		99.00
40	Cape Verde		74	81	3202		66.00

Record#	SHORT_NAME	SANITX	WATERX	HEALTX	POPDRX	CAL92	ADLIT92
41	Cayman Islands						
42	Cen. Afr. Rep.	46	24	13	25920	1691	54.00
43	Chad	32	29	26	30030	1989	45.00
44	Chile	71	96	95	942	2583	95.00
45	China	16	46	90	1063	2729	79.00
46	Christmas Island						
47	Cocos (Keeling)						
48	Colombia	70	96	87	1105	2678	90.00
49	Comoros			82	10000	1897	56.00
50	Congo	9	60	83	3713	2297	71.00
51	Cook Islands						
52	Costa Rica	99	100	97	1133	2889	94.00
53	Croatia	68	96				
54	Cuba	66		100	275	2833	95.00
55	Cyprus			95	585	3782	94.00
56	Czech Republic				273		99.00
57	Denmark	100	100	100	360		99.00
58	Djibouti		43	37	5917		43.00
59	Dominica						97.00
60	Dominican Rep.	85	79	80	949		81.00
61	Ecuador	64		80	652	2587	88.00
62	Egypt	50		99	1316	3336	49.00
63	El Salvador	73	62	40	1515	2663	70.00
64	Equat. Guinea				4212		75.00
65	Estonia				253		99.00
66	Ethiopia	10	27	55	32499	1610	33.00
67	Falkland Islands						
68	Faroe Islands						
69	Fiji			100	2792	3092	90.00
70	Finland	100		100	406		99.00
71	France	96	100		334		99.00
72	French Guiana						
73	French Polynesia						
74	Gabon	76	67	87	1987	2511	59.00
75	Gambia	34	61	90	12525	2360	36.00
76	Gaza Strip						
77	Georgia				182		99.00
78	Germany	100		100	367		99.00
79	Ghana	42	56	25	22970	2206	61.00
80	Gibraltar						
81	Golan Heights						
82	Greece	96			312		94.00
83	Greenland						
84	Grenada					2407	98.00
85	Guadeloupe	71	64	60			
86	Guam						
87	Guatemala	60	62	34	3999	2255	54.00
88	Guinea	6	49	45	7445	2390	33.00
89	Guinea-Bissau	20	57	80	7262	2556	52.00
90	Guyana		83	96	6220	2385	98.00
91	Haiti	24	28	45	10855	1707	43.00
92	Honduras	68	70	62	1266	2306	71.00
93	Hong Kong	88		99	1073	3144	91.00
94	Hungary	94		62	306		99.00
95	Iceland						99.00
96	India	29	63	50	2459	2395	50.00
97	Indonesia	55	63	43	7028	2755	83.00
98	Iran	82		73	3142	2861	65.00
99	Iraq	36		98	1659	2122	55.00

Record#	SHORT_NAME	SANITX	WATERX	HEALTX	POPDRX	CAL92	ADLIT92
100	Ireland	100		100	632		99.00
101	Israel	70	99	100			95.00
102	Italy	100		100	207		97.00
103	Ivory Coast	54	82	60	11739	2491	37.00
104	Jamaica	74	70	90	6420	2607	84.00
105	Japan	85		100	608		99.00
106	Jarvis Island						
107	Johnston Atoll						
108	Jordan	30		90	554	3031	84.00
109	Kazakhstan				254		98.00
110	Kenya	43	49	77	21970	2075	75.00
111	Kirghizia	53	75		303		97.00
112	Kiribati						
113	Kuwait			100	639	2535	77.00
114	Laos	30		67	4446	2259	54.00
115	Latvia				278		99.00
116	Lebanon	75	92	95	537	3319	91.00
117	Lesotho	35	57	80	24095	2201	69.00
118	Liberia		50	39		1640	35.00
119	Libya	18	30	100	957	3310	72.00
120	Liechtenstein						
121	Lithuania				235		98.00
122	Luxembourg						99.00
123	Macao						
124	Macedonia				427		
125	Madagascar	17	32	65	8385	2135	81.00
126	Malawi	63	54	80	44205	1827	54.00
127	Malaysia	94		88	2441	2884	82.00
128	Maldives		70	75	14333	2624	93.00
129	Mali	44	44	20	18376	2279	27.00
130	Malta						87.00
131	Marshall Islands						
132	Martinique						
133	Mauritania	64		45	15772	2685	36.00
134	Mauritius	100		99	1165	2696	81.00
135	Mayotte						
136	Mexico	70	87	91	615	3181	89.00
137	Micronesia						
138	Midway Islands						
139	Moldavia	50			250		96.00
140	Monaco						
141	Mongolia	74	54	100	371	1899	81.00
142	Montserrat						
143	Morocco	63		62	4665	2985	41.00
144	Mozambique	23	28	30	36225	1680	37.00
145	N. Marianas						
146	Namibia	36	57	72	4328	2120	40.00
147	Nauru						
148	Nepal	22		10	13634	1957	26.00
149	Neth. Antilles						
150	Netherlands	100	100	100	399		99.00
151	New Caledonia						
152	New Zealand		97	100	518		99.00
153	Nicaragua			83	2039	2296	65.00
154	Niger	15	57	30	53986	2257	12.00
155	Nigeria	38		67	5208	2125	53.00
156	Niue						
157	Norfolk Island						
158	North Korea	100	100	100	951	2834	95.00

Record#	SHORT_NAME	SANITX	WATERX	HEALTX	POPDRX	CAL92	ADLIT92
159	Norway	100	100	100	308		99.00
160	Oman	72		89	1131		35.00
161	Pakistan	30	60	85	1923	2316	36.00
162	Palau						
163	Palmyra Atoll						
164	Panama	87	82	82	562	2239	90.00
165	Papua New Guinea	26		96	12754	2615	70.00
166	Paraguay	30		63	1231	2670	91.00
167	Peru	47	60	75	939	1883	87.00
168	Philippines	75	84	76	8273	2258	94.00
169	Pitcairn Islands						
170	Poland	100		100	451		99.00
171	Portugal	100	58	100	353		86.00
172	Puerto Rico						
173	Qatar		91	100	667		78.00
174	Reunion						
175	Romania	49		100	538		97.00
176	Russia				222		99.00
177	Rwanda	58	66	80	24967	1821	57.00
178	Saint Helena						
179	Saint Lucia						93.00
180	Saint Pierre						
181	Saint Vincent						98.00
182	San Marino						
183	Sao Tome						60.00
184	Saudi Arabia	86		98	749	2751	61.00
185	Senegal	55	48	40	18192	2265	31.00
186	Seychelles						77.00
187	Sierra Leone	58		38	13622	1695	29.00
188	Singapore	100		100	714		90.00
189	Slovakia	51			287		99.00
190	Slovenia	90					
191	Solomon Islands		69	80		2222	24.00
192	Somalia	18	37	27	13450	1505	27.00
193	South Africa	46				2705	81.00
194	South Korea	100	89	100	1205	3298	97.00
195	Spain	97	99	95	261		98.00
196	Sri Lanka	66		90	6843	2275	89.00
197	St. Kitts						99.00
198	Sudan	55		70	10916	2202	43.00
199	Surinam		98	91	1264	2548	92.00
200	Svalbard						
201	Swaziland		30	66	9091	2706	74.00
202	Sweden	100		100	394		99.00
203	Switzerland	100	100	100	580		99.00
204	Syria	78	87	99	1159	3175	68.00
205	Tadzhikistan	62			424		97.00
206	Taiwan						
207	Tanzania	86	49	93	24973	2021	64.00
208	Thailand	87	81	59	4416	2443	94.00
209	Togo	20	67	61	11385	2243	48.00
210	Tokelau						
211	Tonga						
212	Trinidad	56	82	99	1520	2589	97.00
213	Tunisia	72		90	1549	3333	63.00
214	Turkey	94		100	976	3429	81.00
215	Turkmenistan	60	87		306		98.00
216	Turks and Caicos						
217	Tuvalu						

Record#	SHORT_NAME	SANITX	WATERX	HEALTX	POPDRX	CAL92	ADLIT92
218	U.S. Virgin Is.						
219	Uganda	60	42	71	22399	2162	59.00
220	Ukraine	49	97	100	227		95.00
221	Un.Arab Emirates	95	98	90	1208		78.00
222	United States	85	90	100	421		99.00
223	Uruguay	82	34	82	513	2750	97.00
224	Uzbekistan	18			282		97.00
225	Vanuatu		71	80	7944	2744	65.00
226	Vatican City						
227	Venezuela	55	88		633	2622	90.00
228	Vietnam	21		97	2279	2250	92.00
229	Wake Island						
230	Wallis						
231	West Bank						
232	Western Sahara						
233	Western Samoa						
234	Yemen	51	52	38	4498	2203	41.00
235	Yugoslavia	100			232		
236	Zaire	9	25	59	15150	2060	74.00
237	Zambia	42	47	75	10917	1931	75.00
238	Zimbabwe	58	74	85	7384	1989	83.00

APPENDIX D

HARPI INDICATORS

This appendix provides a listing of the HARPI indicators using the PERICLES Risk Presentation System (PREPS). The indicators presented are the following:

Column	Indicator
Short_name	Country Name
Over_rx	Overall Country Indicator
Cha_rx	State Challenges
Mort2_r	Child Mortality
Lx_r	Life Expectancy
Mal_r	Malaria
Hiv_r	HIV-1 Seroprevalence
Inj2_r	Injuries and Accidents
Cap_rx	State Capabilities
San_r	Access to Sanitation
Wat_r	Access to Safe Water
Hea_r	Access to Health Facilities
Pdr_r	Population Per Doctor
Cal_r	Calories Per Capita
Lit_r	Literacy

Short_name	Over_rx	Cha_rx	Mort2_r	Lx_r	Mal_r	Hiv_r	Inj2_r	Cap_rx	San_r	Wat_r	Hea_r	Pdr_r	Cal_r	Lit_r
Afghanist	4.047003			4.593023	3.087			4.1298		4.806	4.25	1.68	4.913	5
Albania	0.490148	0.743679	1.194	1.037037		0		0.3	0		0	0		1.2
Algeria	1.290108	1.052325	1.333	1.641975		0.182		1.409	1.214	1.971	1.088	0.025	1.093	3.063
American														
Andorra														
Angola	3.908798	3.461395	4.78	4.244186		1.36		4.1325	4.92	4.226	4.667	3.264	3.78	3.938
Anguilla														
Antigua				0.779221										0.2
Argentina	1.047517	1.075738	0.9	1.024691	0	0.727	2.727	1.024	0.522	2.212	2.081	0	1.129	0.2
Armenia	0.822506	1.23376	0.8	0.961039		0	3.174					0		0
Aruba														
Australia	0.399461	0.632422	0.267	0.311688		0.182	1.769	0.1665	0.435	0.231	0			0
Austria	0.431813	0.863627	0.233	0.493506		0.364	2.364	0	0		0	0		0
Azerbaija	0.675479	0.963219	1.028	1.209877		0	1.615					0		0.2
Bahamas				0.896104				0.15375		0.615	0	0		0
Bahrain				1.08642				0.31675		0	0	0		1.267
Baker Isl														
Banglades	2.299151	1.510126	3.052	2.988506	0	0		2.825167	3.857	1.114	1.912	2.305	3.263	4.5
Barbados	0.120238			0.571429				0.03		0	0	0.05	0	0.1
Belgium	0.543059	1.106383	0.333	0.467532		0.364	3.261	0.0924	0	0.462	0	0		0
Belize	1.245024			0.831169	2.344			1.108		1.686	1.853	0.229	1.572	0.2
Benin	3.142475	3.13176	3.759	4.116279		1.52		3.147833	4.44	1.857	3.545	2.432	1.863	4.75
Bermuda														
Bhutan	3.76081			3.666667	4.771			3.5776	5	4.097	2.405	2.136		4.25
Bolivia	1.956872	1.678681	2.652	2.551724	1.329	0.182		2.142333	3.057	2.455	2.297	0.549	3.029	1.467
Bosnia						0								
Botswana	2.305842	3.029193	2.174	1.91358		5		1.944167	2.429	1.857	1.206	1.272	2.501	2.4
Brazil	1.212749	1.576435	1.75	1.740741	1.695	1.12		0.9218	1.5	0.462		0	1.247	1.4
Brit. Vir												0		
Britain	0.246358	0.431127	0.233	0.493506		0.182	0.816	0	0	0				0
Brunei				0.753247				0.778			0.235	0.33	1.414	1.133
Bulgaria	0.669475	1.213951	0.633	1.135802		0	3.087	0.125	0		0	0		0.5
Burkina F	3.737282	3.768512	3.897	4.139535		3.269		3.721667	5	2.697	3.227	4.182	2.224	5
Burma	2.413762	2.131155	3.121	2.758621	0.885	1.76		2.602167	3.171	3.774	3.273	2.271	1.724	1.4
Burundi	3.087235	3.29037	3.862	3.736111		2.273		2.985667	2.829	2.576	1.559	2.712	3.488	4.75
Byeloruss	0.809455	1.61891	0.667	1.308642		0	4.5	0	0		0	0		0
Cambodia	3.542867	3.210917	3.793	3.541667	3.448	2.061		3.764167	5	5	3.045	1.95	3.257	4.333
Cameroon	3.125837	2.58051	2.435	2.942529		2.364		3.3985	3.286	3.645	5	2.22	3.373	2.867
Canada	0.400851	0.684416	0.267	0.337662		0.364	1.769	0.174	0.87	0	0	0		0
Cape Verd				1.938272				1.623		1.629	1.5	0.896		2.467
Cayman Is														
Cen. Afr.	3.825691	3.597741	3.828	3.847222		3.118		3.939667	2.943	4.742	5	3.426	4.277	3.25
Chad	3.83299	3.646969	4.54	4.127907		2.273		3.926	3.743	4.419	4.5	3.731	3.35	3.813
Chile	0.994419	1.446799	0.5	0.805195		0.182	4.3	0.692833	1.595	0.154	0.353	0	1.755	0.3
China	1.762467	1.426027	1.361	1.469136	0	0	4.3	2.042833	4.92	3.323	0.941	0.026	1.447	1.6
Christmas														
Cocos (Ke														

Short_name	Over_rx	Cha_rx	Mort2_r	Lx_r	Mal_r	Hiv_r	Inj2_r	Cap_rx	San_r	Wat_r	Hea_r	Pdr_r	Cal_r	Lit_r
Colombia	0.872537	0.845843	0.1	1.37037	1.549	0.364		0.890333	1.643	0.154	1.147	0.043	1.555	0.8
Comoros				2.942529				2.553			1.441	2.03	3.616	3.125
Congo	2.775037	3.496111	3.552	3.583333		3.353		2.4145	5	2.455	1.382	1.041	2.476	2.133
Cook Isla														
Costa Ric	0.464152	0.73988	0.533	0.480519	1.037	0.909		0.280333	0	0	0.118	0.054	1.11	0.4
Croatia			0.6			0			1.738	0.154				
Cuba	0.848239	1.203347	0.333	0.61039		0	3.87	0.6115	1.833	0.308	0	0	1.228	0.3
Cyprus	0.190435			0.38961				0.1506		0	0.353	0	0	0.4
Czech Rep		0.485486	0.333	1.123457		0						0		0
Denmark	0.150924	0.402463	0.233	0.61039		0.364		0	0	0	0	0		0
Djibouti				4.034884				3.1555		3.516	3.773	1.395		3.938
Dominica				1.037037										0.1
Dominican	1.035704	1.020583	1.389	1.333333	0	1.36		1.0478	0.87	1.343	1.559	0		1.467
Ecuador	1.31691	1.269275	1.417	1.432099	1.683	0.545		1.348667	1.929	1.857	1.559	0	1.747	1
Egypt	1.305441	1.428655	2.217	2.068966		0		1.243833	2.714	1.057	0	0.129	0	3.563
El Salvad	1.56434	1.044599	1.333	1.728395	0.077	1.04		1.910833	1.5	2.333	3.636	0.21	1.586	2.2
Equat. Gu				4.069767								1.121		1.867
Estonia		0.634457	0.533	1.37037		0						0		0
Ethiopia	4.049101	3.566636	4.36	4.127907		2.212		4.290333	5	4.548	2.946	3.915	4.583	4.75
Falkland														
Faroe Isl														
Fiji	0.721794			1.098765				0.6464		1.286	0	0.729	0.417	0.8
Finland	0.481605	1.08361	0.167	0.558442		0	3.609	0	0	0	0	0		0
France	0.57445	1.148899	0.3	0.402597		0.545	3.348	0	0	0		0		0
French Gu														
French Po														
Gabon	2.086086	2.999593	3.569	3.277778		2.152		1.629333	1.357	2.03	1.147	0.402	1.907	2.933
Gambia	3.044956	3.789868	4.86	4.418605		2.091		2.6725	3.629	2.394	0.941	2.271	2.3	4.5
Gaza Stri														
Georgia	0.681677	1.022516	0.7	0.935065		0	2.455					0		0
Germany	0.30906	0.61812	0.233	0.519481		0.182	1.538	0	0		0	0		0
Ghana	3.039281	2.721176	3.069	2.942529		2.152		3.198333	3.171	2.697	4.583	3.208	2.731	2.8
Gibraltar														
Golan Hei														
Greece	0.427955	0.648922	0.333	0.311688		0.182	1.769	0.133333	0			0		0.4
Greenland														
Grenada				1.283951									2.168	0
Guadeloup								2.161	1.595	2.212	2.676			
Guam														
Guatemala	2.195493	1.659731	1.778	1.925926	2.208	0.727		2.552667	2.143	2.333	3.909	1.087	2.594	3.25
Guinea	3.406749	3.505581	5	4.476744		1.04		3.357333	5	3.129	3.409	1.64	2.216	4.75
Guinea-Bi	3.064447	3.995674	5	4.593023		2.394		2.598833	4.6	2.636	1.559	1.611	1.812	3.375
Guyana	1.484649			1.876543	3.494			1.0044		1.114	0.235	1.443	2.23	0
Haiti	3.194556	2.376891	2.761	2.873563	1.085	2.788		3.739667	4.28	4.484	3.409	2.111	4.216	3.938
Honduras	1.85749	1.929975	1.806	1.567901	2.506	1.84		1.809167	1.738	1.857	2.568	0.108	2.451	2.133
Hong Kong	0.451382	0.739705	0.2	0.181818		1.84	0.737	0.259167	0.609	0	0	0.03	0.216	0.7
Hungary	0.845801	1.370469	2.522	1.407407		0.182		0.531	0.087	0	2.568	0		0
Iceland				0.233766										0

Short_name	Over_rx	Cha_rx	Mort2_r	Lx_r	Mal_r	Hiv_r	Inj2_r	Cap_rx	San_r	Wat_r	Hea_r	Pdr_r	Cal_r	Lit_r
India	2.207378	1.602195	2.63	2.436782	0.615	0.727		2.610833	3.914	2.273	3.182	0.594	2.202	3.5
Indonesia	1.686841	1.092103	2.196	2.172414	0	0		2.083333	2.429	2.273	3.5	1.573	1.392	1.333
Iran	1.212959	0.955398	1.806	1.592593	0.423	0		1.384667	1.071	0.692	1.971	0.872	1.169	2.533
Iraq	1.866978	1.336694	3.569	1.777778	0	0		2.2205	3.514	3.387	0	0.268	2.966	3.188
Ireland	0.262799	0.525597	0.233	0.61039		0.182	1.077	0	0		0	0		0
Israel	0.632693	0.779636	0.3	0.454545		0.182	2.182	0.48575	1.643	0	0			0.3
Italy	0.289209	0.553419	0.267	0.324675		0.545	1.077	0.025	0		0	0		0.1
Ivory Coa	2.806	3.453	3.448	3.625		3.286		2.4825	2.486	1.171	2.676	2.196	1.949	4.417
Jamaica	1.256574	0.87039	0.5	0.831169		1.28		1.449667	1.452	1.857	0.941	1.476	1.705	1.267
Japan	0.288548	0.373984	0.2	0.064935		0	1.231	0.2202	0.87	0.231	0	0		0
Jarvis Is														
Johnston														
Jordan	1.003621	0.656552	1.083	1.54321		0	0	1.235	3.857	0.692	0.941	0	0.653	1.267
Kazakhsta	1.245389	1.868083	1.139	1.333333		0	5					0		0
Kenya	2.790668	3.012337	2.522	2.977011		3.538		2.679833	3.114	3.129	1.735	3.133	3.101	1.867
Kirghizia	1.494301	1.935102	1.333	1.407407		0	5	1.0535	2.543	1.571		0		0.1
Kiribati														
Kuwait	0.612667	0.437113	0.467	0.662338		0.182		0.718		0	0	0	1.857	1.733
Laos	2.5812	2.25525	3.603	3.625	1.793	0		2.7985	3.857	3.645	2.297	1.159	2.583	3.25
Latvia		0.687354	0.667	1.395062		0						0		0
Lebanon	0.649904	0.976379	1.278	1.469136		0.182		0.486667	1.405	0.462	0.353	0	0	0.7
Lesotho	2.671476	2.658096	3.155	2.425287		2.394		2.678167	3.571	2.636	1.559	3.291	2.745	2.267
Liberia				3.013889				3.95		3.065	3.682		4.47	4.583
Libya	1.742937	1.501479	2.196	2.126437		0.182		1.863667	4.76	4.355	0	0	0	2.067
Liechtens														
Lithuania	1.144595	1.716892	0.633	1.234568		0	5					0		0
Luxembour				0.558442										0
Macao														
Macedonia			1.028			0						0		
Madagasca	2.665006	2.108686	3.259	2.885057		0.182		2.943167	4.84	4.226	2.405	1.791	2.93	1.467
Malawi	3.60176	4.664946	5	4.348837		4.646		3.070167	1.976	2.818	1.559	5	3.818	3.25
Malaysia	0.751619	0.655046	0.467	1.185185	0.423	0.545		0.816	0.087	0.615	1.088	0.586	1.12	1.4
Maldives	1.760563			2.241379				1.6644		1.857	1.853	2.443	1.669	0.5
Mali	3.578592	3.447442	4.44	4.302326		1.6		3.644167	3.057	3.452	5	2.829	2.527	5
Malta				0.506494										1.067
Marshall														
Martiniqu														
Mauritani	2.685506	2.822852	3.793	3.555556		1.12		2.616833	1.929	1.743	3.409	2.58	1.54	4.5
Mauritius	0.573251	0.702753	0.667	1.259259		0.182		0.5085	0	0	0	0.067	1.517	1.467
Mayotte														
Mexico	1.136744	1.643637	1.306	1.185185	0	0.727	5	0.714333	1.643	0.846	0.824	0	0.073	0.9
Micronesi														
Midway Is														
Moldavia	1.480178	1.861812	0.867	1.580247		0	5	0.971333	2.714			0		0.2
Monaco														
Mongolia	1.508719	1.41049	2.174	2.057471		0		1.557833	1.452	2.818	0	0	3.61	1.467
Montserra														
Morocco	2.183181		2.196	2.103448				2.194333	1.976	2.515	2.568	1.194	0.83	4.083

Short_name	Over_rx	Cha_rx	Mort2_r	Lx_r	Mal_r	Hiv_r	Inj2_r	Cap_rx	San_r	Wat_r	Hea_r	Pdr_r	Cal_r	Lit_r
Mozambiqu	4.213868	3.924605	4.4	4.255814		3.118		4.3585	4.36	4.484	4.167	4.405	4.318	4.417
N. Marian														
Namibia	2.730299	2.705563	2.261	2.62069		3.235		2.742667	3.514	2.636	2.027	1.14	2.972	4.167
Nauru														
Nepal	3.077778	1.831444	3.328	3.277778	0.538	0.182		3.908667	4.44	3.194	5	2.376	3.442	5
Neth. Ant														
Netherlan	0.172407	0.387916	0.267	0.337662		0	0.947	0	0	0	0	0		0
New Caled														
New Zeala	0.472427	0.925604	0.3	0.584416		0.182	2.636	0.01925		0.077	0	0		0
Nicaragua	1.62104	1.28409	1.861	1.691358	1.402	0.182		1.8906		2.636	1.382	0.423	2.479	2.533
Niger	3.84391	3.401395	4.6	4.244186		1.36		4.065167	5	2.636	4.167	5	2.588	5
Nigeria	2.968259	3.316444	4.12	3.708333		2.121		2.794167	3.4	3.516	2.297	1.281	2.958	3.313
Niue														
Norfolk I														
North Kor	0.414461	0.734716	1.056	1.148148		0		0.254333	0	0	0	0	1.226	0.3
Norway	0.337066	0.758399	0.267	0.402597		0.182	2.182	0	0	0	0	0		0
Oman	1.58537	1.089583	0.733	1.333333	2.11	0.182		1.982	1.548	2.697	1.029	0.053		4.583
Pakistan	2.062734	1.437836	3.259	2.310345	0	0.182		2.479333	3.857	2.455	1.265	0.376	2.423	4.5
Palau														
Palmyra A														
Panama	0.965506	0.727016	0.933	0.935065	0	1.04		1.1245	0.696	1.171	1.441	0	2.639	0.8
Papua New	2.350552	2.170129	2.63	2.965517	2.721	0.364		2.470833	4.12	4.29	0.235	2.292	1.688	2.2
Paraguay	1.681395	0.769238	1.611	1.283951	0	0.182		2.2895	3.857	5	2.514	0.094	1.572	0.7
Peru	1.706978	1.288194	1.889	1.777778	1.122	0.364		1.986167	2.886	2.455	1.853	0	3.656	1.067
Philippin	1.378274	1.192185	1.639	1.740741	1.207	0.182		1.502333	1.405	1.057	1.794	1.773	2.585	0.4
Pitcairn														
Poland	0.704239	1.411537	0.533	1.148148		0.182	3.783	0.1384	0	0.692	0	0		0
Portugal	0.981922	1.282075	0.367	0.701299		0.364	3.696	0.7418	0	2.576	0	0		1.133
Puerto Ri			0.5				2.727							
Qatar				1.222222				0.55125		0.538	0	0		1.667
Reunion														
Romania	1.033037	1.348324	0.967	1.296296		0	3.13	0.71775	2.771		0	0		0.1
Russia	1.213374	1.820062	0.7	1.580247		0	5					0		0
Rwanda	3.140574	4.034721	4.6	4.151163		3.353		2.6935	2.257	2.091	1.559	3.356	3.835	3.063
Saint Hel														
Saint Luc				1.037037										0.5
Saint Pie														
Saint Vin				1.160494										0
San Marin														
Sao Tome				1.654321										2.867
Saudi Ara	0.810299	0.683497	1.028	1.320988	0.385	0		0.894833	0.783	0.385	0	0	1.401	2.8
Senegal	3.085346	2.73837	2.674	3.861111		1.68		3.258833	2.429	3.194	3.636	2.811	2.566	4.917
Seychelle				1.160494										1.733
Sierra Le	3.778142	4.160093	5	5.116279		2.364		3.587167	2.257	3.903	3.727	2.375	4.261	5
Singapore	0.326036	0.533581	0.2	0.675325		0.182	1.077	0.16	0	0	0	0		0.8
Slovakia	0.72164	0.557613	0.5	1.17284		0		0.885667	2.657			0		0
Slovenia			0.267			0			0.435					
Solomon I				1.234568				2.78975		1.914	1.559		2.686	5

Short_name	Over_rx	Cha_rx	Mort2_r	Lx_r	Mal_r	Hiv_r	Inj2_r	Cap_rx	San_r	Wat_r	Hea_r	Pdr_r	Cal_r	Lit_r
Somalia	4.229435			4.186047				4.236667	4.76	3.903	4.417	2.359	4.981	5
South Afr	2.083904	2.198475	2.022	2.149425		2.424		1.969333	2.943				1.498	1.467
South Kor	0.276683	0.538383	0.467	1.148148		0		0.145833	0	0.692	0	0.083	0	0.1
Spain	0.368076	0.739922	0.3	0.311688		1.04	1.308	0.0706	0	0	0.353	0		0
Sri Lanka	1.533838	1.236846	0.633	1.049383	3.083	0.182		1.731833	1.833	2.636	0.941	1.543	2.538	0.9
St. Kitts				1.283951										0
Sudan	2.49558	2.547407	2.935	3.347222		1.36		2.469667	2.429	1.457	2.135	2.117	2.742	3.938
Surinam	0.821845			1.246914	1.146			0.672		0	0.824	0.107	1.829	0.6
Svalbard														
Swaziland	2.468186			2.770115				2.4078		4.355	2.351	1.904	1.496	1.933
Sweden	0.274721	0.549442	0.167	0.233766		0.182	1.615	0	0		0	0		0
Switzerla	0.129718	0.345913	0.233	0.25974		0.545		0	0	0	0	0		0
Syria	0.835886	0.973325	1.278	1.641975		0		0.767167	1.262	0.846	0	0.065	0.097	2.333
Tadzhikis	1.061608	1.325565	1.861	1.259259		0	2.182	0.709667	2.029			0		0.1
Taiwan														
Tanzania	2.64058	3.350741	3.362	3.472222		3.218		2.2855	0.783	3.129	0.588	3.356	3.257	2.6
Thailand	1.416841	1.473102	1.333	1.407407	1.061	2.091		1.379333	0.696	1.229	2.73	1.154	2.067	0.4
Togo	3.064716	3.305481	3.276	3.069444		3.571		2.944333	4.6	2.03	2.622	2.162	2.627	3.625
Tokelau														
Tonga														
Trinidad	0.951491	0.988807	0.6	1.08642		1.28		0.932833	2.371	1.171	0	0.212	1.743	0.1
Tunisia	1.045951	1.037185	1.556	1.555556		0		1.050333	1.548	0.923	0.941	0.223	0	2.667
Turkey	0.564905	0.908262	1.917	1.716049	0	0		0.336	0.087	0.462	0	0	0	1.467
Turkmenis	1.265404	1.783559	1.972	1.901235		0	3.261	0.74725	2.143	0.846		0		0
Turks and														
Tuvalu														
U.S. Virg														
Uganda	3.320915	4.377078	3.828	4.430233		4.873		2.792833	2.143	3.581	2.081	3.165	2.854	2.933
Ukraine	1.111781	1.714506	0.7	1.358025		0	4.8	0.6296	2.771	0.077	0	0		0.3
Un.Arab E	0.546466	0.556299	0.633	0.805195	0.423	0.364		0.5386	0	0	0.941	0.085		1.667
United St	0.653609	1.09937	0.333	0.519481		0.909	2.636	0.297	0.87	0.615	0	0		0
Uruguay	1.354803	1.359006	0.7	0.974026		0.545	3.217	1.352	1.071	4.097	1.441	0	1.403	0.1
Uzbekista	1.553245	1.503179	1.5	1.382716		0	3.13	1.62	4.76			0		0.1
Vanuatu	2.220506			1.876543	4.639			1.8056		1.8	1.559	1.72	1.416	2.533
Vatican C														
Venezuela	0.97523	0.776519	0.833	1.074074	0.654	0.545		1.1342	2.429	0.769		0	1.673	0.8
Vietnam	1.682954	1.155886	1.528	1.876543	1.037	0.182		2.034333	4.52	3.839	0.118	0.521	2.608	0.6
Wake Isla														
Wallis														
West Bank														
Western S														
Western S														
Yemen	2.504011	1.932028	3.569	3.736111	0.423	0		2.885333	2.657	2.939	3.727	1.167	2.739	4.083
Yugoslavi			0.733			0.182			0			0		
Zaire	3.258514			3.486111		2.576		3.334333	5	4.677	2.73	2.521	3.145	1.933
Zambia	3.211074	4.372222	4.2	3.916667		5		2.6305	3.171	3.258	1.853	2.117	3.517	1.867
Zimbabwe	2.453778	3.54	2.37	3.25		5		1.910667	2.257	1.629	1.265	1.63	3.35	1.333

APPENDIX E

PERICLES SUMMARY

"The old international order of the Cold War that is disappearing before our eyes was a familiar thing to us. It was very comforting to us. It had form. It had substance. It had ideology. It could be seen. It could be touched. It could be studied. It could be heard. It had its demons. Its devils. Its Stalins. It had armies we could point to. It served as a very convenient and appropriate single point of focus for the Free World's response. As long as we responded to this monolith, surely we could handle any included regional problem that could come along. That focus is now blurred. The form and substance are disappearing before our eyes, vanishing in a whirlwind of change, change, and still more change."[1]

General Colin L. Powell
Chairman, Joint Chiefs of Staff, 1991

E-1. OVERVIEW

a. As chairman of the Joint Chiefs of Staff, Colin Powell was responsible for ensuring that the military forces of the United States were organized and equipped to both deter war and promote peace. Recent literature is replete with books and articles citing the need for an in-depth analysis of the nonmilitary factors that lead to state instability. In their book, Flashpoints: Promise and Peril in a New World, Robin Wright and Doyle McManus state that, "because of instant communications and world-wide access, we can, if we choose, identify and deal with the issues, challenges, and flashpoints of a new era as they emerge. ...[we are] the first generation with the ability to see global change as it occurs ... unique opportunity to shape and direct the future."[2] A framework is required to assist the analyst in identifying these potential future flashpoints and in formulating initiatives to defuse those potential "hot" spots in a timely fashion. One of the key challenges currently facing the military leadership is identifying and quantifying the risks threatening the new world order following the demise of the Soviet Union. The United Nations (UN) was involved in only 13 peacekeeping operations in the 42 years following 1945. In the next 4 years (between 1987 and 1991), the UN was involved in another 13 peacekeeping operations.[3]

b. The world is facing a globalization of prosperity paralleled by a proliferation of poverty. The PERICLES Study was triggered by an article by Robert Kaplan which stated that "scarcity, crime, overpopulation, tribalism, and disease are rapidly destroying the social fabric of our planet."[4] The two worlds--developed and developing--were described in terms of a stretch

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[1] From Globalism to Regionalism: New Perspectives on US Foreign and Defense Policies, NDU, 1993.

[2] Wright, Robin and Doyle McManus: Flashpoints: Promise and Peril in a New World, Alfred A. Knopf, New York, 1991.

[3] Boutros-Ghali, Boutros: An Agenda for Peace, United Nations, New York, 1992.

[4] Kaplan, Robert D. "The Coming Anarchy," Atlantic Monthly, February 1994, pp 44-76.

limousine on the pot-holed streets of New York where homeless beggars live. Inside the limousine were North America, Europe, and the Pacific rim; outside were the remaining nations. The article contrasted that part of the world that is rushing forward toward global unity with the remainder that is moving backward toward a new era of fragmentation. The overarching PERICLES purpose is to develop a framework enabling the identification of potential country instability with the intent of facilitating timely and well-informed decision making.

E-2. PERICLES OBJECTIVE. PERICLES is intended to assist the Army leadership practice "preventive defense" by identifying potential crisis spots early, thereby reducing the need for future military intervention. The PERICLES framework is being developed to improve the understanding of indicators of instability. In addition, the framework will be useful in formulating alternatives once a country is identified as potentially "unstable." PERICLES is designed to function as an executive-level decision support system as well as an analytic tool for identifying and evaluating potential areas of concern to the US and its allies. Study Report CAA-SR-96-9, PERICLES Economic Risk in Countries and Lands Evaluation Study (PERICLES), dated August 1996, reported on the results of that study. PERICLES II is in progress. This chapter summarizes that report.

E-3. PERICLES CATEGORIES AND FACTORS

a. PERICLES Categories. A list of potential determinants of risk was developed by conducting an extensive literature search to identify potential determinants of state instability and interviewing organizations responsible for collecting and/or evaluating country risk data. Three types of organizations were interviewed--US government, international, and private. These organizations provided the rationale for factor selection and, in many cases, became key country data sources. The list of candidate factors was grouped into four categories--economic, political, social-cultural, and environment-infrastructure.

b. Economic Factors

(1) The new dynamic of power centers more on economic prowess than on military muscle. Political scientists are increasingly recognizing that gross domestic product (GDP) is a better indicator of international influence than the number of tanks, aircraft, or troops. The importance of economics is demonstrated in the development of strong economic blocs such as the European Community (EC) and international agreements such as General Agreement on Tariffs and Trade (GATT) and the North Atlantic Free Trade Agreement (NAFTA). Fouad Ajami states that, in today's world, economic considerations are the overwhelming determinant ("men want Sony not soil").[5] Table E-1 presents the factors selected to represent the economic category along with the respective data source for each.

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[5] Ajami, Fouad, "The Summoning," Foreign Affairs, Fall 93, pp 2-9.

Table E-1. Economic Factors

FACTOR	SOURCE
Debt/GDP	World Bank
Current Account/GDP	World Bank
Foreign Exchange Reserves/Merchandise Imports	World Bank
Purchasing Power Parity	United Nations Human Development Office
Unemployment	International Labor Office
Military Expenditures/GDP	US Arms Control Disarmament Agency/World Bank
Income Distribution	World Bank

(2) Debt-to-GDP is an indicator of a government's debt servicing burden. The higher the ratio, the greater the portion of the country's overall economic resources that must be used to service debt.

(3) Current Account-to-GDP is an indicator of a country's balance of payments adjustment capability. The larger the current account deficit relative to domestic output, the more likely the need for external financing, including arrears and debt relief, a situation which can lead to instability.

(4) Foreign Exchange Reserves-to-Merchandise Imports is an additional indicator of a country's balance of payments adjustment capability. The country with many months of import cover is less likely to experience liquidity problems, run arrears, or require debt relief. The score for this indicator is based upon the level of foreign exchange reserves relative to average merchandise imports over the previous 3 years.

(5) Purchasing Power Parity (PPP) is real GDP adjusted to account for detailed price comparisons of individual items covering over 150 categories of expenditure. The PPP was developed as part of the United Nations International Conversion Project (ICP) in order to "enable conversion of national currency output levels into a common unit of measurement. ... coefficients are derived from price relatives of common baskets of goods and services expressed in the currencies of each of the participating countries."[6]

(6) Unemployment is the percentage of population without work, available for work, and seeking work. This factor is a measure of the inability of population to contribute to the generation of domestic product. Note that these data are dependent upon national reports as highlighted by the fact that many of the states in the Former Soviet Union (FSU) currently report no unemployment. Note also that the measurement criteria changes from country to country, e.g., inclusive age range and gender considerations, and that the quality of the existing employment is not considered. "Long-term unemployment is creating a new class of

[6] World Economic and Social Survey, 1994: Current Trends and Policies in the World Economy," United Nations, New York, 1994, p 240.

'untouchables'--by excluding a large group of people from the mainstream of development and society. ... low-productivity employment is a major problem in developing countries."[7]

(7) The Military Expenditures/GDP factor indicates the fraction of the gross domestic product allocated to the military. It is "an indicator of a government's ability to obtain the domestic financing it needs to service its foreign debt. All else being equal, a high level of military spending absorbs fiscal resources which could otherwise be utilized for foreign debt service and real resources which could be more productively employed elsewhere in the economy. These real resources could be used to generate higher levels of economic growth and ultimately higher fiscal revenues."[8] This is a key factor considered by both the International Monetary Fund (IMF) and the World Bank in authorizing loans. The UN Human Development Office has suggested that "aid allocations [be made] dependent on the recipient country's ratio of military to social spending--progressively reducing aid as the ratio becomes greater than 1."[9]

(8) Income Distribution measures the percentage of income by segment of the population. It is an indicator of the equity of income distribution within a state.

c. Political Factors

(1) Alvin and Heidi Toffler argue that "war-makers of the world do not merely calculate economic pluses and minuses before plunging into war. They calculate, instead, their chances of seizing, expanding, or retaining political power."[10] In his article (op. cit.), Robert Kaplan predicts that the existing world map of countries will be replaced by a "jagged-glass" pattern of city states, shanty-states, and tribal domains. Table E-2 presents the factors selected to represent the political category along with the data source for each.

Table E-2. Political Factors

Factor	Source
Political Development/Capacity	Professors Organski and Kugler (The War Ledger)
Political Rights	Freedom House
Civil Liberties	Freedom House
Press Freedom	Freedom House
Legal/Justice System	Interagency Country Risk Assessment Committee
Gender Issues/Women's Rights	World Bank

[7] The World Health Report 1995: Bridging the Gaps, World Health Organization, Geneva, 1995, pp 40 and 81.

[8] Bond, Daniel L.: "Country Risk Analysis at Ex-Im Bank," Ex-Im Bank, Washington DC

[9] United Nations Human Development Report 1994, pp 56-57.

[10] Toffler, Alvin and Heidi, War and Anti-War: Survival at the Dawn of the 21st Century, Little Brown and Company, Boston, 1993.

Note that while the economic factors described in paragraph E-3b above represent the economic forces which compel business leaders to think and act globally (focus is external to the nation), the political factors considered in this process measure the strong electoral forces which encourage politicians to think and act locally (focus internally to the nation). Analysis of both the economic and the political categories will allow the decision maker to consider how a country acts both globally and nationally.

(2) Political Development/Capacity (tax capacity) refers to the extractive capability of a government in a developing country. This factor is a measure of the transformation of a population from subjects into citizens. Jeffrey Herbst reports on the fact that "war affected ... the creation of centralized and efficient structures to collect taxes ... some states will probably be unsuccessful in finding ways of building the state in times of peace and will therefore remain permanently weak. ... war often causes a 'ratchet effect' whereby revenue increases sharply when a nation is fighting but does not decline to the ante-bellum level when hostilities have ceased."[11] In The War Ledger, Professors A.F.K. Organski and Jacek Kugler discuss the concept of tax effort, maintaining that this factor measures the "transformation of a population from subjects into citizens ... political development means capacity, and capacity is dependent on political performance in two areas: penetration of the national society by central government elites to control as many subjects/citizens as possible within the political jurisdiction of the state, and the capability of the government to extract resources from its society."[12] The identification of "tax capacity" as a factor for instability is predicated on the proposition that a government's ability to raise revenues is a critical indicator of effective performance and that the degree of fiscal extraction measures the range and depth of government control on the population.

(3) In the 1995 Comparative Survey of Freedom, Freedom House reports on "political freedom," a combination of political rights and civil liberties. This measure is "not based on government intentions or constitutions ... [but rather on the] real-world state of freedom based on governmental, non-governmental, and/or external factors." Political freedom is represented in PERICLES by two interrelated factors--political rights and civil liberties. While the percentage of countries in the "free" category by countries has risen by 25 percent since 1985, the percentage of the population in the "free" category during this same timeframe has decreased by over 40 percent.[13]

(a) The political rights factor evaluates the degree with which people can participate freely in the political process--the system by which a polity chooses the authoritative policy makers and makes decisions affecting the national, regional, or local community. Some of the elements included in this factor are free and fair elections, the presence of competitive parties,

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[11] Herbst, Jeffrey: "War and the State in Africa," International Security, Spring 1990, pp 118-121.

[12] Organski, A. F. K. and Jacek Kugler: The War Ledger, University of Chicago Press, Chicago, 1980.

[13] "1995 Comparative Survey of Freedom," Freedom House, Jan/Feb 1995, University Press, Lanham, MD pp 7-9.

minority representation in government, and decentralized political power as demonstrated in free subnational elections.

(b) Civil liberties refers to the freedom to develop views, institutions, and personal autonomy apart from the state. This measure examines the areas of censorship, political terror, prevention of free association, repression, religious freedom, private business activity, and free private discussions.

(4) Press freedom is judged by the independence of the news media from government repression and the absence of political, economic, social, and occupational influences on journalists and media managers by government officials. Freedom in the World--1995 rates 31 percent of the countries as "not free with little authority moral or otherwise," 33 percent as partly free, and 36 percent as free.[14]

(5) The legal/justice system indicates the recourse provided to individuals by the state and the abilities of the state to enforce laws.

(6) The gender issues/women's rights factor evaluates income distribution to women as a surrogate for women's rights.

d. Social-cultural Factors

(1) John Dunn defines social and cultural risk as "that set of hazards ... that arise from the fact that human beings are not merely economic agents in institutionalized political settings but also social and cultural creatures."[15] Much of the discussion regarding the causes of instability in the literature center on Samuel Huntington's "Clash of Civilizations" in which he postulates that the "fundamental source of conflict in this new world will not be primarily ideological or primarily economic. The ... dominating source of conflict will be cultural. ... The fault lines between civilizations will be the battle lines of the future."[16] Table E-3 presents the factors identified in the socio-cultural category in PERICLES along with the current data source(s) for each.

Table E-3. Social-cultural Factors

Factor	Source
Crime Rate	FBI/NSA/Interpol
Internally Displaced Persons Burden	US Committee on Refugees
Refugee Burden	UN High Commissioner for Refugees
Ethnic/Religious Diversity	CIA

[14] 1995 Freedom in the World, Freedom House, University Press, Lanham, MD, 1995.

[15] Dunn, John: "Country Risk: Social and Cultural Aspects" in Herring, Richard: Managing International Risk, Cambridge University Press, Cambridge England, 1983, p 139.

[16] Huntington, Samuel P.: "The Clash of Civilizations?", Foreign Affairs, Summer 1993, pp 22-49.

(2) Crime rate, for purposes of PERICLES, refers to the rate of crimes committed against persons, to include murders, sexual offenses, and violent assaults. This factor is important because a population's faith in its government can be undermined by the perception that the number of crimes committed exceeds the state's capacity to enforce laws. The importance of this factor is highlighted in a Heritage Foundation study which states that more Russians died of criminal violence in 1993 than were killed in 9 years of war in Afghanistan. "There seems to be a worldwide trend of increasing violence. Poverty, unemployment, overcrowding, and reduced control over the upbringing of young people are key factors. So too are drug and alcohol abuse, frequent exposure to violence on the streets and television, and, for many, a sense of failure, frustration, and hopelessness."[17]

(3) The nature of conflict is changing. Conflict increasingly tends to be intrastate, protracted, and often associated with ethnic divisions. The United Nations reports that 90 percent of the casualties of these conflicts are civilian.[18] These conflicts result in millions of uprooted people, termed "internally displaced persons" while they remain within the borders of their home state, "refugees" when they cross international boundaries. Movement of population is closely linked to the spread of disease, e.g., the spread of cholera among refugees from Rwanda.

(a) The internally displaced persons burden factor addresses those persons who would be classified as refugees if they had crossed international borders. The import of this factor is demonstrated by the estimated additional 100 million farmers in China who are moving toward the Chinese cities annually. Robert Kaplan in "The Coming Anarchy" describes the situation in West Africa where he saw "young men everywhere--hordes of them. They were like loose molecules in a very unstable social fluid, a fluid that was clearly on the verge of igniting."[19] The needs of these people must be met by the government and/or the local population.

(b) The refugee burden of a country is measured by the number of people who cross borders for protection. A large refugee population drains resources and can evoke xenophobic reactions including violent demonstrations and riots. This factor addresses crumbling multiethnic, multinational, and multireligious states such as Yugoslavia, Rwanda, and Sudan. The population of the Former Soviet Union includes over 104 nationalities. The magnitude of the Bosnian presence under temporary protection in Germany has influenced the recent Bundestag decision to begin the forcible repatriation of the 320,000 Bosnians from Germany despite an appeal from the UN High Commissioner for Refugees to delay this expulsion. Switzerland has decided to follow the lead of Germany in protecting/repatriating the Bosnians in Switzerland. Paul Kennedy and Matthew Connelly state that the major problem of the 21st century is that "across our planet a number of ... demographic-technological fault lines are emerging, between fast-growing, adolescent, resource-poor, undercapitalized and undereducated

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[17] World Health Report, p 17.

[18] United Nations Human Development Report 1994, Oxford University Press, New York, 1994, p 47.

[19] Kaplan, p 46.

populations on one side and technologically inventive, demographically moribund, and increasingly nervous rich societies on the other." These authors argue that mass migrations from the "South" will overwhelm the "North" unless a global effort is made to slow the buildup of demographic and environmental pressures.[20]

(4) The ethnic/religious diversity factor was identified as key to measuring instability. This factor captures the degree of heterogeneity of a population. The premise is made that the more heterogeneous a society, the greater the chance for ethnic/religious tension.[21] In the study "World View: The 1995 Strategic Assessment from the Strategic Studies Institute," Dr. Earl Tilford states that "ethnicity and religion have supplanted ideology as [the] social forces most likely to promote violence. These forces are challenging established institutions such as national governments and old alliances like the North Atlantic Treaty Organization (NATO)."[22] Major General William Stofft, Commandant of the US Army War College maintains that, while "our armed forces' primary mission is to fight and win wars, ... early, collective participation to contain or dampen ethnic conflicts can protect allies, create breathing room for fledgling democracies, and contribute to regional stability."[23] Currently, ethnic homogeneity is used as a surrogate for ethnic religious diversity.

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[20] Kennedy, Paul and Matthew Connelly: "Must It Be The Rest Against The West," Atlantic Monthly, December 1994, pp 61-91.

[21] Esty, Daniel C., et al: *State Failure Task Force Report* Washington: Central Intelligence Agency, 1995.

[22] Tilford, Earl: World View: The 1995 Strategic Assessment from the Strategic Studies Institute, Strategic Studies Institute, Carlisle, PA, 1995, p 16.

[23] Stofft, William A. and Dr. Gary L. Guertner: "Ethnic Conflict: Implications for the Army of the Future," p 2-3.

e. Environmental-infrastructure Factors

(1) In a provocative article, Thomas Homer-Dixon maintains that "environmental scarcity causes violent conflict ... [which] tends to be persistent, diffuse, and sub-national." He predicts that future wars and civil violence will erupt as a result of scarcities in resources--primarily water, arable land, forests, and fish.[24] Table E-4 presents the factors selected to represent the environment-infrastructure category in PERICLES along with the current data source for each factor.

Table E-4. Environment-infrastructure Factors

Factor	Source
Value of Fuel Imports per Capita	World Bank
Annual Fresh Water Withdrawals per Capita	World Resources Institute
Public Health	United Nations
Education	United Nations
Food	United Nations

For Robert Kaplan, environment is the most important national security issue of the early 21st century due to the political and strategic impact of surging populations on spreading diseases, deforestation, soil erosion, water depletion, and air pollution. The explosion at Chernobyl in 1986 is frequently cited as ***the*** watershed event in the demise of the Soviet Union.

(2) Value of fuel imports per capita--this factor measures the degree of energy self-sufficiency enjoyed by each country. Fuel is a basic need for a nation. In most cases, the survival of a nation and its people depends on it.

(3) Annual fresh water withdrawals per capita--Rapidly increasing populations and increasing development of large irrigation-intensive agricultural projects are leading to water scarcities and conflict over access to available water supplies. Examples of this are the friction between Egypt-Ethiopia over the Nile, Hungary-Slovakia over the Danube, and Turkey-Iraq over the Tigris-Euphrates. Another example is the heavy pumping of the aquifers by Israel, resulting in the exhaustion of West Bank wells and the infiltration of sea water from the Mediterranean into the aquifers' water tables.

(4) Public health--conflict can lead to the disruption of public health services, environmental hazards (decrease in sanitation and access to safe water), severe food shortages (decline in nutrition), and the rapid spread of disease. Currently, infant mortality is used as a surrogate for public health.

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[24] Homer-Dixon, Thomas: "Environmental Scarcities and Violent Conflict," International Security, Summer 1994, Massachusetts Institute of Technology, Boston, pp 5-40.

(5) Education--this factor represents the literacy of a population as a measure of the ability and willingness of the state to provide adequate education for its population.

(6) Food--this factor portrays the food security situation in each state. The daily calorie supply available per capita affects the stability of the state insofar as it measures the capacity of each state to adequately feed its population.

f. Summary. The 4 categories and 22 factors included in the PERICLES framework are listed in Table E-5.

Table E-5. PERICLES Categories and Factors

- **ECONOMIC**
  - Debt/GDP
  - Current Account/GDP
  - Foreign Exchange/Imports
  - Purchasing Power Parity
  - Unemployment
  - Military Expenditures/GDP
  - Income Distribution
- **POLITICAL**
  - Political Development/Capacity
  - Political Rights
  - Civil Liberties
  - Press Freedom
  - Legal/Justice System
  - Gender Issues -- Women's Rights
- **SOCIAL/CULTURAL**
  - Crime Rate
  - Refugee Burden
  - Internally Displaced Persons Burden
  - Ethnic Diversity
- **ENVIRONMENT/INFRASTRUCTURE**
  - Fuel Imports per capita
  - Fresh Water -- Internally Renewable
  - Public Health
  - Education
  - Food

E-4. PERICLES RISK RATINGS. The PERICLES instability construct consists of five levels of instability spanning a risk rating scale of 0 to 5. Least risk is assigned the value of 0, and maximum risk is assigned the value of 5. The breakpoint values of risk which demarcate the five levels are the integers 1, 2, 3, and 4. Adjectives were ascribed to each of the levels. The PERICLES instability construct is shown in Table E-6. The narrative will be enhanced by the use of synonyms for what would become the frequently repeated term "instability level." These will be "quintile," "band," "indicator," and "group."

Table E-6. Instability Levels

Instability level	Risk rating	Description
1	Less than 1	Negligible risk
2	Between 1 and 2	Marginal risk
3	Between 2 and 3	Moderate risk
4	Between 3 and 4	Serious risk
5	Greater than 4	Critical risk

a. Translation of Data into Risk Ratings. Raw data, or scores, for the factors have disparate units of measurement. Examples are 46.9 percent for the debt-to-GDP factor in the case of Chile and 2,257 calories per capita per day for the food supply factor in Malaysia. The task consists of aligning the scale for data of each factor to a common scale of risk rating. A score in any given unit of measurement can then be translated into a PERICLES risk rating. The alignment is relatively easy when the agency providing the data has also developed a rating construct reasonably similar to that of Table E-6. All that is required is to align the breakpoints of the two rating systems and to interpolate within each of the five levels. Breakpoints are never made coincident with a data point. Any data point for a country will therefore fall somewhere within one of the five ranges of risk rating, thus avoiding any ambiguity. In the case of a factor where data does not come with an analogous rating system, alignment was done by the use of a statistical technique called the K-mean. This could be referred to as "grading on a curve." The K-mean technique organizes observations into clusters with the goal of minimizing the differences between each observation and the mean of each cluster. Three inputs are required: the number of observations, the number of clusters desired (five in this case; corresponding to the number of instability levels), and the data itself. The four breakpoints indicated by K-mean are made coincident with the four PERICLES breakpoints. Translation then follows as before. The five adjectives of Table E-6, used to provide a more descriptive narrative, are to be viewed on a relative basis. They are intended to more vividly convey the identity of group assignment. A reference to "critical," for example, means only that a country is in the poorest statistical quintile for a given factor. It may or may not mean anything on an absolute basis. Receiving the lowest rating relative to one's peers does suggest the greatest potential for instability; however, it is not a prediction that instability will indeed occur.

b. Conversion of Instability Level to Color. Table E-7 shows the colors selected to represent each of the five levels of instability. These colors are used in the PERICLES Risk Evaluation Presentation System (PREPS), the information mapping system developed to geographically portray and demonstrate PERICLES results and provide for user interaction. For purposes of this report, the colors will be represented in black and white with the legend on each map identifying the delineations.

Table E-7. Instability Colors

Instability level	Risk rating	Color
1	Less than 1	Blue
2	Between 1 and 2	Green
3	Between 2 and 3	Yellow
4	Between 3 and 4	Orange
5	Greater than 4	Red

E-5. PERICLES RISK EVALUATION AND PRESENTATION SYSTEM (PREPS). PREPS is a computer mapping application designed to support risk analysis at the international level. The application was developed on an MS-DOS/Windows 3.1 based personal computer. PREPS permits a user to view a number of different map themes depicting relative country risks for a variety of factors. Three levels of specificity are maintained:

Detailed factor
Category
Country (overall)

The user can switch to a different theme or can examine aggregate-level (i.e., category or country) themes. Countries of interest can be selected, and theme-specific reports and bar chart risk ratings on these countries can be displayed on the computer screen. The user can perform "what-if" analysis on data for a selected country, temporarily modifying data and assessing any resulting changes on the map. Figure E-1 is an example, presenting Current Account-to-GDP factor results for Central and South America. PREPS is currently configured to operate at the factor level of detail. The system is currently being expanded to operate down to the subfactor level of detail.

Figure E-1. Current Account to GDP Factor Results for Central and South America

APPENDIX F

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